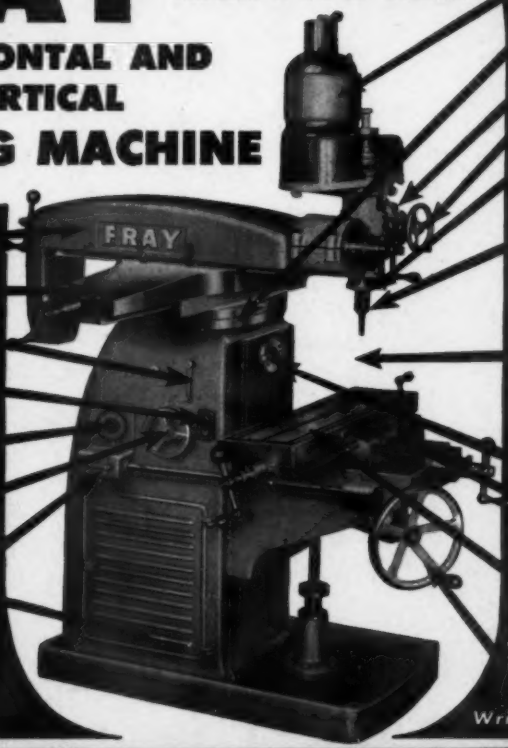
MACHINE TOOL BLUE BOOK

JULY 1942

7342/16

RAY **RAM TYPE No.9**

HORIZONTAL AND VERTICAL MILLING MACHINE



...m cross ...vel—10"
...ongitudinal ...vel—18"
...ntal spindle ...ear control
...n switch ...and start
...ble feed ...d control
...d control ...tal spindle
...er feed ...table
...horizontal ...e—3 h.p.
...base ...pump— ...tional
...—3800 ...

Vertical head motor—1 h.p.

Turret Head Calibrated—360

Lever Feed

Wheel Feed

Quill travel—4"

Vertical spindle No. 9 Brown & Sharp No.3 Morse optional

Nose of spindle to top of table Minimum—0" Maximum—16"

Horizontal spindle standard No. 40 taper

Cross travel—9"

Table working surface—9½"x36"

Longitudinal travel—20"

Vertical travel—16"

Write for literature

RAY MACHINE TOOL COMPANY

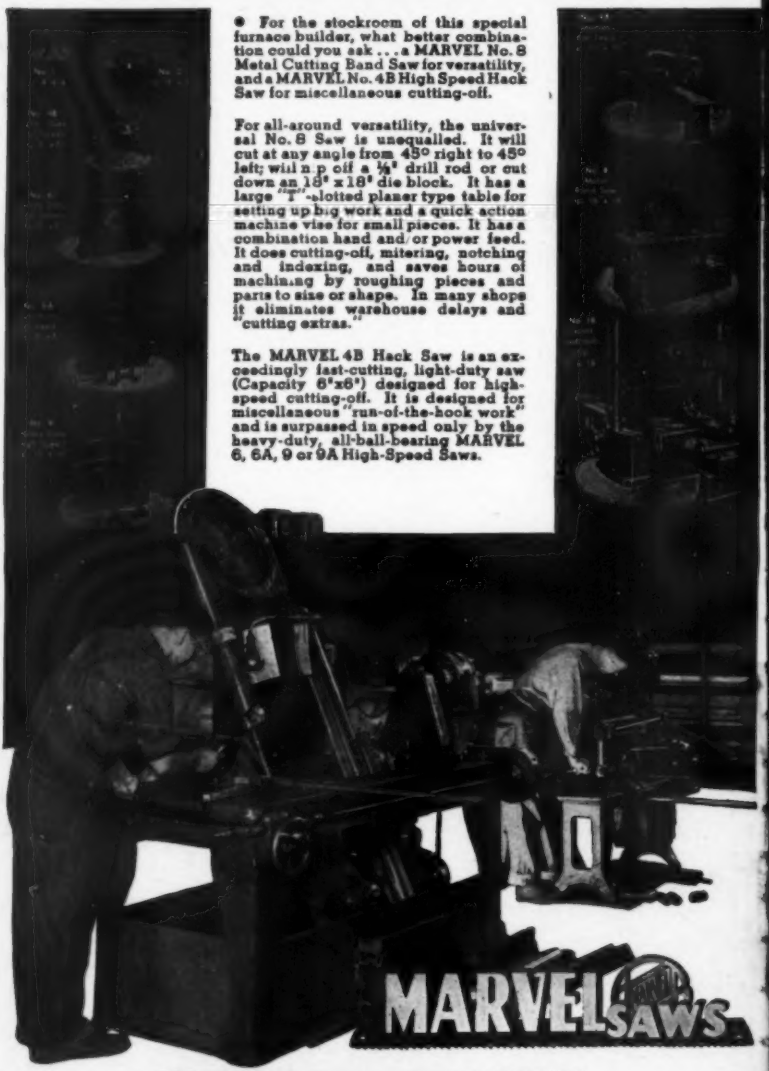
501 W. Windsor • • Glendale, California

"Versatility" and "Speed" Characterize *these two* MARVEL SAWS

● For the stockroom of this special furnace builder, what better combination could you ask . . . a MARVEL No. 8 Metal Cutting Band Saw for versatility, and a MARVEL No. 4B High Speed Hack Saw for miscellaneous cutting-off.

For all-around versatility, the universal No. 8 Saw is unequalled. It will cut at any angle from 45° right to 45° left; will nip off a ½" drill rod or cut down an 18" x 18" die block. It has a large "T"-slotted planer type table for setting up big work and a quick action machine vise for small pieces. It has a combination hand and power feed. It does cutting-off, mitering, notching and indexing, and saves hours of machining by roughing pieces and parts to size or shape. In many shops it eliminates warehouse delays and "cutting extras."

The MARVEL 4B Hack Saw is an exceedingly fast-cutting, light-duty saw (Capacity 6"x6") designed for high-speed cutting-off. It is designed for miscellaneous "run-of-the-hook work" and is surpassed in speed only by the heavy-duty, all-ball-bearing MARVEL 6, 6A, 9 or 9A High-Speed Saws.



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Eastern Sales: 225 Lafayette St., New York

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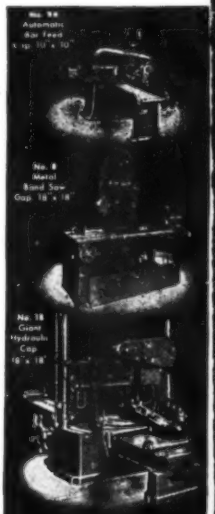

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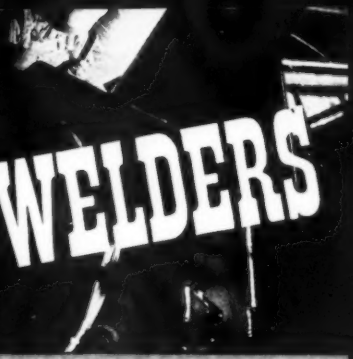

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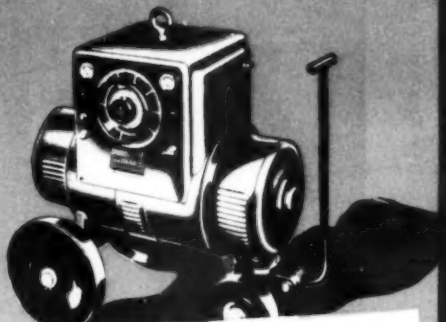

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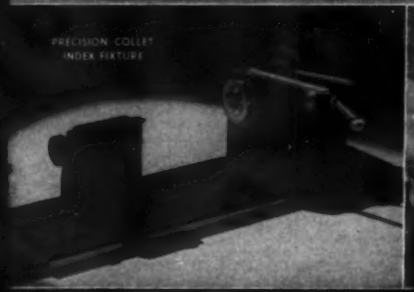

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Machine Tool Blue Book

Hitchcock Publishing Co., 508 So. Dearborn St., Chicago

34,500 This Issue *Volume 38, No. 7*

JULY 1942

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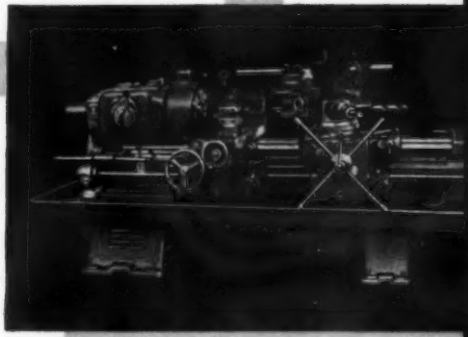
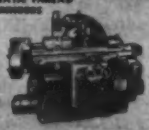
LEMUEL HEDGE

UNTIL 1818, sheets and blank books had been lined by hand, but in that year Lemuel Hedge built the first machine for ruling paper. The same principles are still used in modern ruling machines. By replacing handwork with sound mechanical means for controlling both tool and work, this early Vermont machine builder cut the cost of this operation by 75%. This is another instance where the direct predecessors of Jones & Lamson performed an outstanding service to industry.



No. 7A Jones & Lamson Saddle Type Universal Turret with standard chucking equipment.

JONES & LAMSON



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OPTICAL COMPARATORS

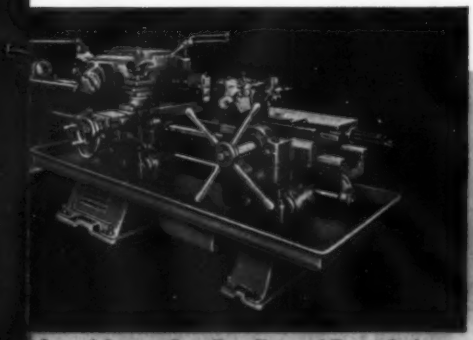
BAM TYPE UNIVERSAL TURRET LATHE

s still cutting costs for you!

MOST of the machines built by Lemuel dge have long been obsolete. Obsolete are the pioneer models of Vermont n who followed Hedge — men like bbard, Robbins, Lawrence, Howe and rtness. Yet their original designs sur- e today, to cut costs for you, in modern es & Lamson Machine Tools — im- ved, advanced and speeded up through seless development by present day es & Lamson engineers.

Because of these improvements, every dern Jones & Lamson machine em- lies exceptional reserves of speed, rigidity and useful power. With these modern machines you can take *full* advantage of the hard alloy cutting tools now available *or in prospect.* With these machines you can meet the present demand for wartime production and still be ready to compete successfully for postwar business.

To deal with today's emergency and protect your future needs, put your production problems up to Jones & Lamson engineers. Inquiries from large companies or small receive prompt attention here.



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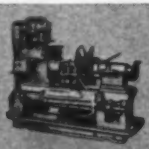
MACHINE COMPANY

SPRINGFIELD, VERMONT, U. S. A.

SADDLE TYPE UNIVERSAL TURRET LATHE



FAY AUTOMATIC LATHES

AUTOMATIC OPENING DIE HEADS

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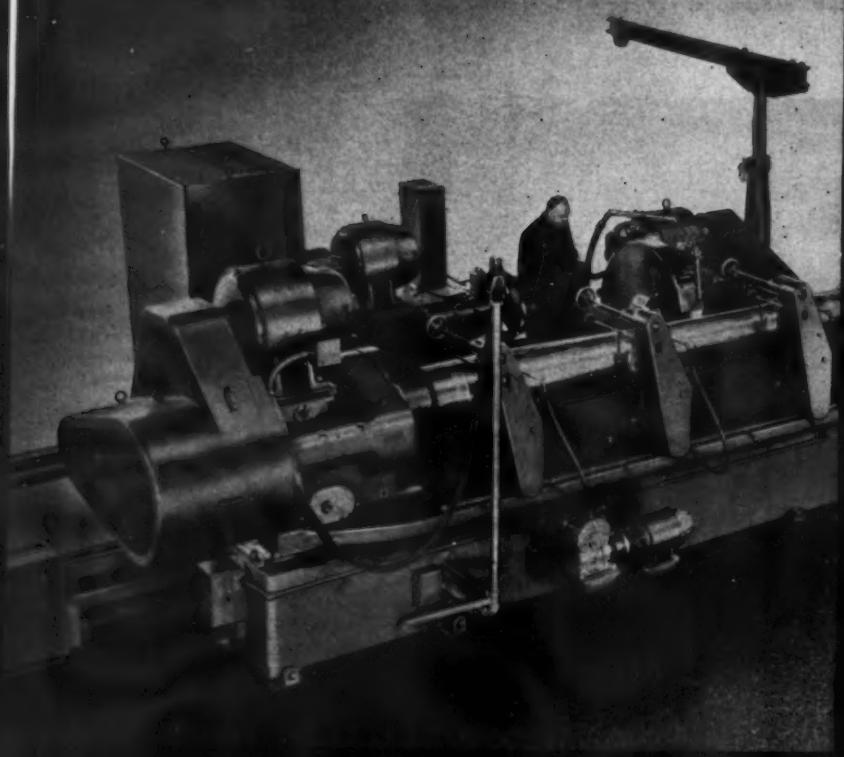
A NORTON for Heavy Ordnance Grinding



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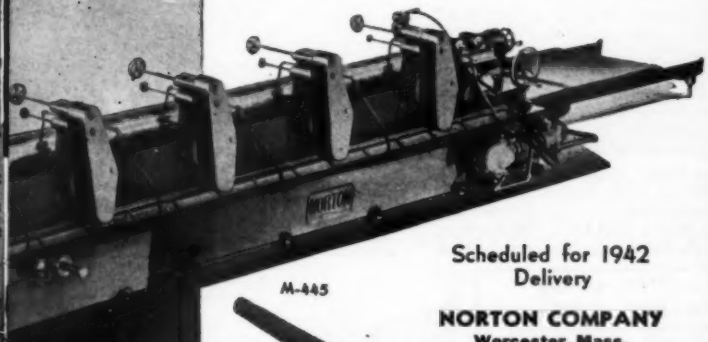

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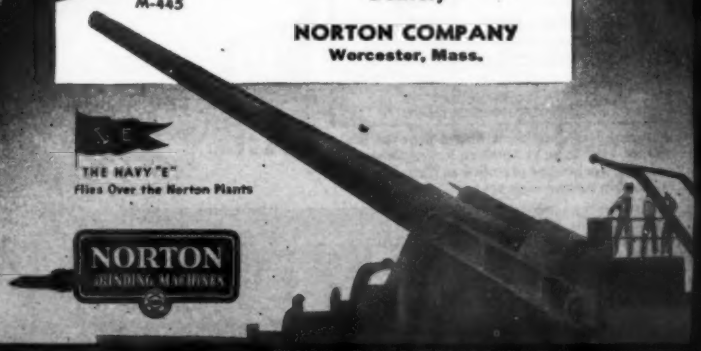

THE NAVY "E"
Flies Over the Norton Plants

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Do You Have Parts of Small Arms

On all types of milling operations for the class of work indicated, Sundstrand No. 0 Rigidmils and engineered production are giving remarkable speed, ease, and economy.

Fast — No. 0 Rigidmil speed begins with set-up. Spindle r.p.m., feed rate and operating cycle can be established very quickly. Convenient panel gives operator complete control of electric motors. After set-up, speed continues in operating cycles which include rapid traverse of 325" a minute.

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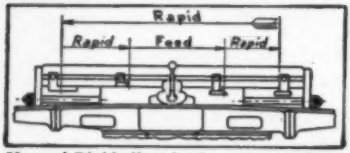
Versatile — High production and accuracy on various types and combinations of milling operations can be maintained easily on the No. 0 Rigidmil. High-ratio, 48 to 1, spindle head provides speeds from 25 r.p.m. to 2400 r.p.m. in two ranges, with 61 possible changes in each range. A half-dozen standard table-control dogs suffice for setting up the most frequently used cycles; a few specials meet the unusual conditions.

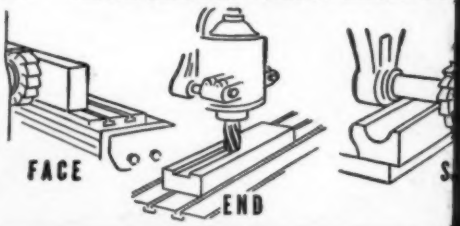
To Help You Mill More — Sundstrand Engineered Production Service gives you the benefit of priceless data files and practical experience on thousands of milling jobs, helps you solve new and unusual milling problems. Use this service freely. Send data for production proposals, without cost or obligation.

Get These Bulletins

Interesting Sundstrand publications shown above give information about No. 0 Rigidmils; the smaller No. 00; the larger No. 1; and spindle speeds for materials ranging from steel to magnesium. All four sent promptly on request for Bulletins 402.



Unusual Rigidmil cycle above grooves brass pieces 1⅛" long at 1800 an hour. Others do milling operations sketched at right in single, skip-stop or two-way set-ups.



SUNDSTRAND MACHINE TOOL CO. ROCKFORD ILLINOIS U.S.A.

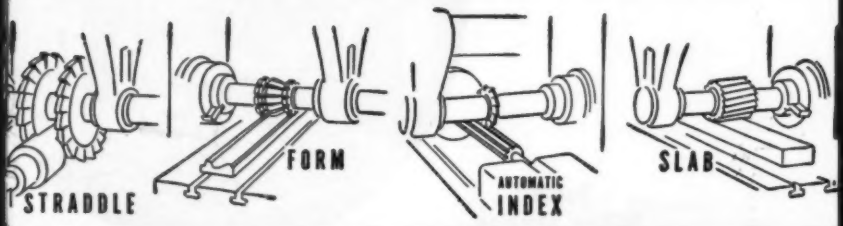
SUNDSTRAND

2535 ELEVENTH STREET

Production

achine Guns, Bombs, Fuses, To Mill?

This picture, taken between shifts in a small-arms factory, shows some of the Sundstrand No. 0 Rigidmils used for a wide variety of milling operations on rapid-fire gun parts. Similar batteries of Rigidmils, and Sundstrand Automatic Lathes, are growing rapidly in United Nations munitions plants.



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CKFORD ILLINOIS U.S.A.

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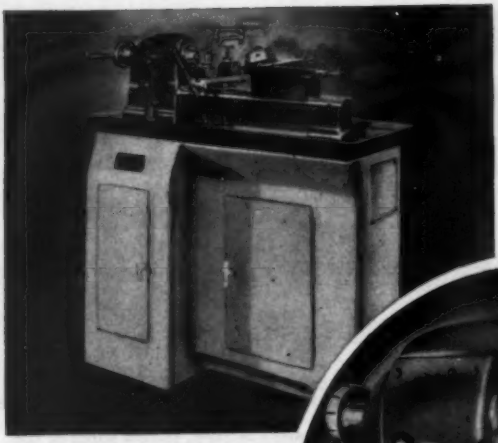
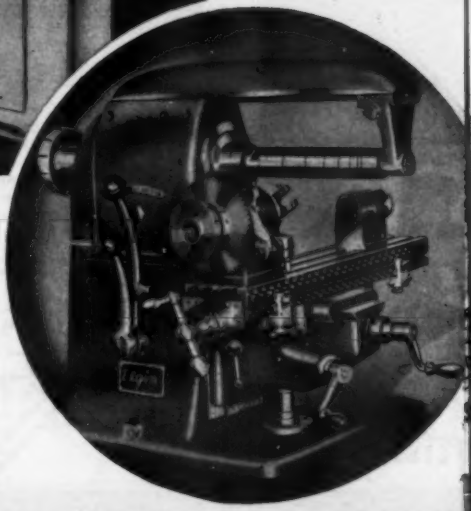


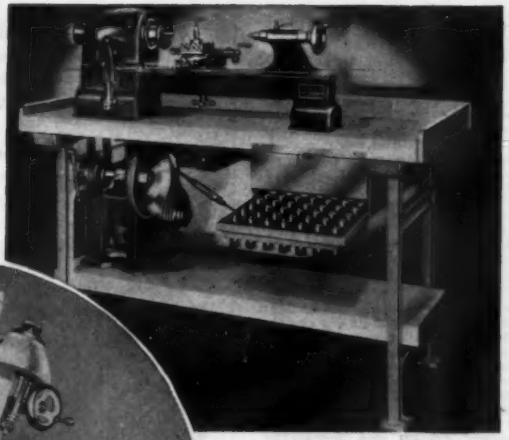
Precision Hand
Screw Machine



Bench
Milling Machine

ELGIN TOOL

MACHINE TOOLS



Precision Bench Lathe

Vertical Milling Machine

ORKS

1772 BERTEAU AVE.
AT RAVENSWOOD AVE.
CHICAGO. ILLINOIS

After The War —No Depression

We look down the road and plan for the dawn of that better day when peacetime needs will once more be the first line activity of American industry and labor. It is evident that the enormous capacity of our new plants and modern equipment will permit America, for the first time, to make enough of all kinds of goods to go around to all our people.

Post-war costs can be very low because these new factories will be "charged off" by the time the war is over. Furthermore, craftsmanship is on the increase and working with the hand is no longer looked down upon. A vast reservoir of new and improved products will be ready to flow to every corner of the land if the profit motive and the American enterprise system prevail. We cannot tolerate another prolonged depression, interference with business or an economy of scarcity.

There are two schools of thought that are advocating methods of continuously spreading our production among our people. Under one plan, certain academic thinkers would limit production, would subsidize the incompetent plant, the national debt would continue to mount and the profit motive would be stifled. Our capitalistic system and democratic processes could not long endure under such a plan.

Another school of thought favors unrestricted free enterprise, elimination of monopolies, correction of restraints caused by patents, cessation of uneconomic deterrence by unions, a tax program that would encourage new enterprise and a free competitive productive economy.

Business management is putting its house in order for post-war productivity that will be possible if the "doers" and not the politicians predominate in planning.

* * * * *

For peace adaptability, the new process known as Contour Sawing is ideal. Without a single change, each DoAll can be put to work catching up on the vast array of civilian goods that will be in demand as soon as the last shot is fired.

DoAll

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come in ever-increasing quantities—ta
planes, jeeps, helmets, guns, bullets.

Behind the allied fighting forces str
miles of production lines, thousand
modern machine tools, millions of wor
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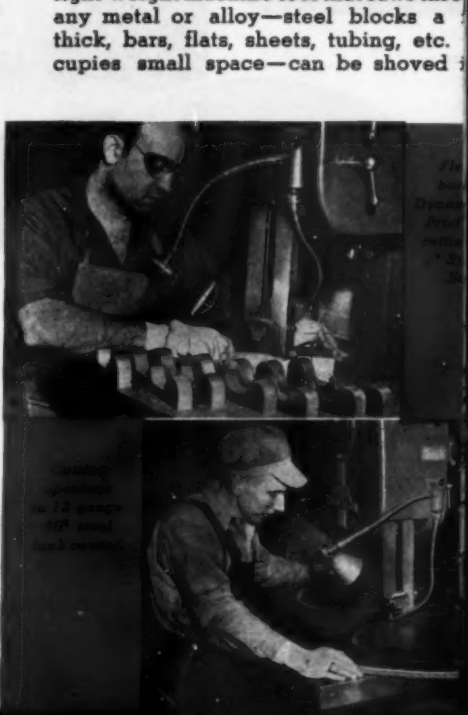
cupies small space—can be shoved



WINS THE BATTLE OF

PRODUC

he regular work line to elieve heavy millers and igher-priced shapers of ver-load work. Cuts out pecial parts and tools with-ut dies. Saws 70 to 80 hapes at one time from tacked sheets.

DoAll is the fastest preci-ion method to remove netal. Does a week's work n a day—a day's work in n hour—an hour's work n 15 minutes.

NEW BOOK—Case histo-ies of DoAll performance. Photographically told, with hort sentences, for busy xecutives. Send for copy.

DoAll saved 18 hours on this job. Production cutoff of angle irons. Former method, torch and grind-off burr.

IN WAR OR PEACE

DoAll can save you valuable time and money. Let a factory-trained man come to your plant and in a few minutes, show you many ways in which DoAll can increase your production.

CONTINENTAL MACHINES, INC.

300 So. Washington Ave., Minneapolis, Minn.

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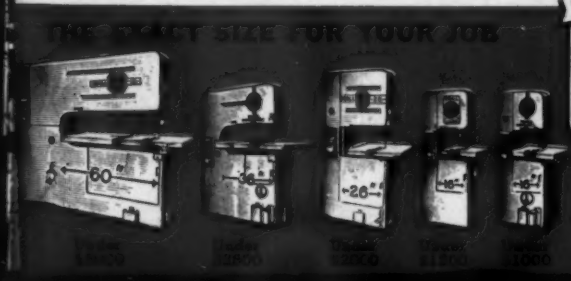

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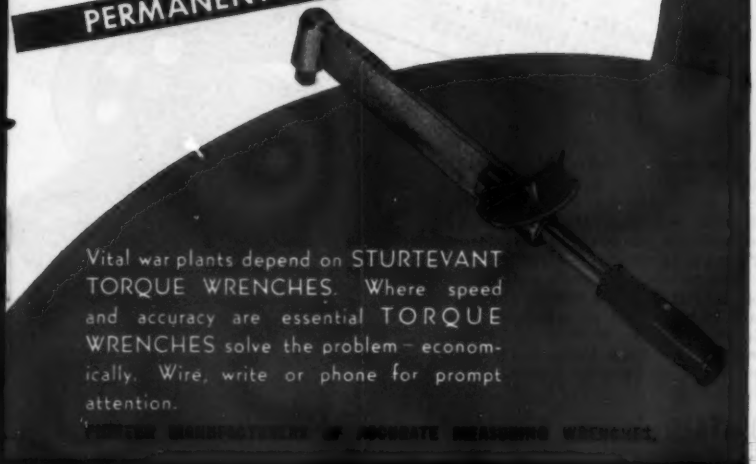
TORQUE WRENCH

PERMANENT ACCURACY



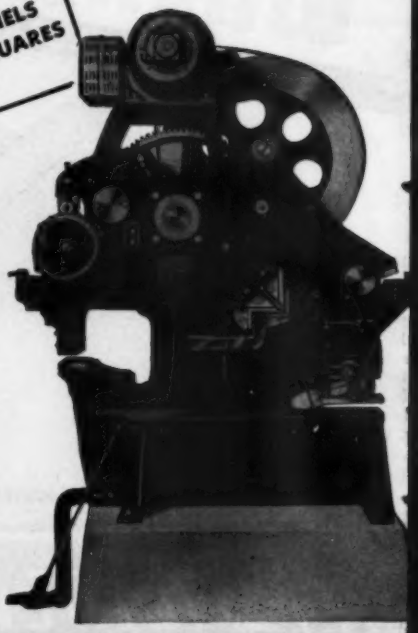
Vital war plants depend on STURTEVANT TORQUE WRENCHES. Where speed and accuracy are essential TORQUE WRENCHES solve the problem – economically. Wire, write or phone for prompt attention.

P. A. STURTEVANT CO.

ADDISON QUALITY ILLINOIS

TEAM-MATE OF FAST PRODUCTION

for
PUNCHING . . SHEARING
SLITTING . . COPING . . NOTCHING
of
ANGLES . . TEES . . CHANNELS
I-BEAMS . . ROUNDS . . SQUARES
FLATS . . PLATES



Here's one of Industry's reliable *strong-arms* — a versatile, heavy-duty fabricator for a wide variety of metal working jobs. Judged by yesterday's production standards, it's a whole crew of skilled workers —turning out the work swiftly, accurately and never asking for time out. In hundreds of armament producing plants, Buffalo Universal Iron Workers are teaming up manpower to shorten the Battle of Production.

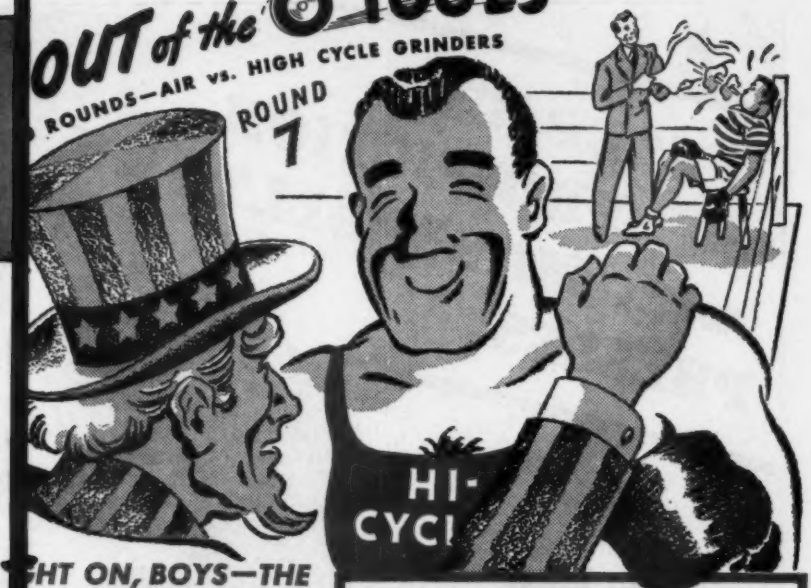
BUFFALO FORGE COMPANY
161 Mortimer St., Buffalo, N. Y.
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

"Buffalo" UNIVERSAL IRON WORKER

OUT of the O'TOOLS

ROUNDS—AIR vs. HIGH CYCLE GRINDERS

ROUND 7



GHT ON, BOYS—THE RDER YOU SLUG, E SOONER I WIN!"

e Sam likes this Bout of the ools because he knows that AIR HIGH-CYCLE are fighting to which type of portable tool turn out the MOST PRODUC-N under given conditions in us war plants. He says, "Slug , boys. Every time one of you , a portable tool situation is well care of. That helps me win."

e decision for Round 7 goes IGH-CYCLE because on this cular job he kicked up sparks and at less cost than AIR. his War Winner's Report.

ll in the Rotor Analyst for un-d suggestions on the selection and servicing of portable tools.

WAR WINNER'S REPORT

TO: *Uncle Sam*

Here is my contribution to the war effort of a steel mill:

(1) Saved 66% in first cost of power unit.

(2) Boosted production 30%.

(3) Saved 75% in electric power.

(4) Cut maintenance cost 20%.

(5) Lengthened life of grinding wheels 10%.

HIGH CYCLE O'TOOL

(Winner, Round 7, Bout of the O'Tools)

AIR

ROTOR TOOL

HIGH CYCLE

THE ROTOR TOOL CO.

CLEVELAND, OHIO

UNBIASED ANALYSIS OF PORTABLE TOOL PROBLEMS

STEP UP PRODUCTION with MARSHALLTOWN PRESSES

The Most For Your Money!

Marshalltown Presses are engineered and built to give the utmost in dependable, trouble-free service. Features of design include more die space, chrome nickel cranks, wrist pin connections and many other proven advantages. Available in capacity of 5 to 70 tons—each one an outstanding value.

NO. 5 FLYWHEEL TYPE

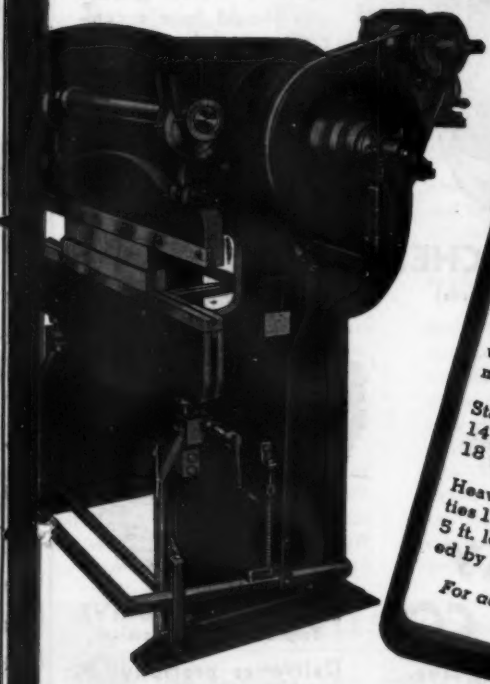
Write today for literature about Marshalltown Presses—available in capacities from 5 to 70 tons.

MARSHALLTOWN MFG. CO.

900 E. NEVADA ST., MARSHALLTOWN, IOWA

POWERFUL

CHICAGO STEEL PRESS BRAKE



This No. 253 is a POWERFUL, rugged, inexpensive Press Brake, designed and built to the standards of Chicago Steel Forming Presses.

This money-saving production tool will handle 40 to 50 percent of the work done in an average shop. Greater speed, higher efficiency—much lower operating cost—plus the highest quality material and sturdy welded construction as in our larger machines.

Standard Series—3 sizes—capacities 14 gage, 4 ft. long; 16 gage, 8 ft. long; 18 gage, 6 ft long.

Heavy Duty Series—3 sizes—capacities 10 gage, 4 ft. long, V die; 12 gage, 5 ft. long; 14 gage, 6 ft. long. Powered by ¾ to 1½ h. p. motors.

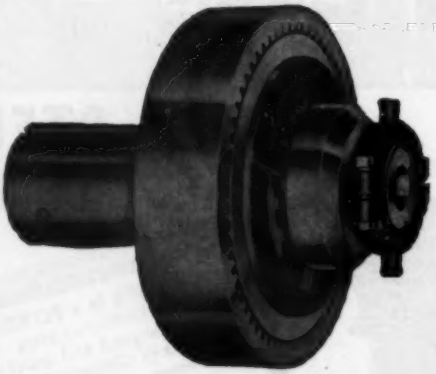
For additional information write for catalogs.

REIS & KRUMP MANUFACTURING CO.

440 LOOMIS BLVD., — CHICAGO, ILL.

You'd Be Surprised at the

MANY MODELS *available in*



CONWAY CLUTCHES

ON YOUR DESK you should have a complete set of the Conway Catalogs and Bulletins. It's your best reference and "library of information" on how to get best results from "clutch-power."

Write for them.

CONWAY CLUTCHES

(Patented in U. S. A. and Canada)

OFFER YOU:

full floating plates
high ratio leverage
easy engagement
easy release instantly
drag-free idling

GEAR TOOTH DRIVE
Triple Plate Mechanism

Deliveries promptly on standard sizes or where minor variations are needed.

THE CONWAY CLUTCH CO.

1541 Queen City Ave.

CINCINNATI, OHIO

Lo-swing MODEL LR LATHE

r Economy
l Consistent
ccuracy on
me Production
on Short and
edium Runs

"LR" is a fully automatic, erated lathe, incorporat- e time-tested Lo-swing le of sufficient mass and ool support. Its field in- practically any work its capacity — 2" diam. mal stock removal, 4" diam. for light " diam. for flanged work — and up to ween centers in the longest bed length. achine, while offering the utmost in ty, is 100% mechanical without any s in the feed train. Not only is the "LR" simple machine to service, but once annot get out of time. All rotating shafts ll-friction bearing equipped. Lubrication quate and automatic. Carriage ways hardened steel to provide greater wear g qualities.

f set-up and operation are provided by uilt-in Seneca Falls CHANGE-OVER ANISM by which length of carriage may be quickly varied; CONVENIENT s for throwing in and out the feed and rapid traverse (normally automatic) manually, and by the LOW CENTER HEIGHT (37") which allows the operator to examine and adjust all tools from the operating position. Low center height also contributes to ease of loading.

Model "LR" Lo-swing is designed to provide maximum efficiency with carbide tools. It is a versatile lathe in that it may be equipped with either direct V belt drive to the spindle for high speed, fine finishing cuts, or a geared drive with pickoff gears for slower roughing cuts. The Model "LR" Lo-swing may also be equipped with a Third Slide (overhead) as well as additional back-squaring attachments, carriages and carriage slides, making for innumerable tooling possibilities.

SENECA FALLS *Automatic* WORK DRIVER

Self Centering... Quick Acting... No Slip. Attaches to any chuck plate or spindle. Provides a positive, balanced drive which reduces chatter. Handles rough forgings or turned pieces—straight or taper. Eliminates dogging time. Reduces tool breakage. Write for details and size range.

NECA FALLS MACHINE CO. SENECA FALLS, N.Y.

MANUAL PRESSURE Can't Slow THE WORKING SPEED

of A Mall TRADE MARK GEARED HEAD GRINDER

● The pressure-free, high torque in the working tools on a MALL Geared-Head Grinder assure maximum production, a higher quality product, and more output per man-hour.

These units can be rolled to the work. The light weight tools minimize operator fatigue. The constant high speed increases tool life and reduces spoilage. Maintenance cost is low. And, the electric power is shut off when unit is not in use. Full ball-bearing, quickly interchangeable, straight and angle spindles can be furnished for every Grinding, Disc, Cone and Drum Sanding, Drilling, Filing and Polishing job. This three-shift performer will repay its cost in any shop—Write TODAY for full details and prices and ask for a FREE Demonstration.

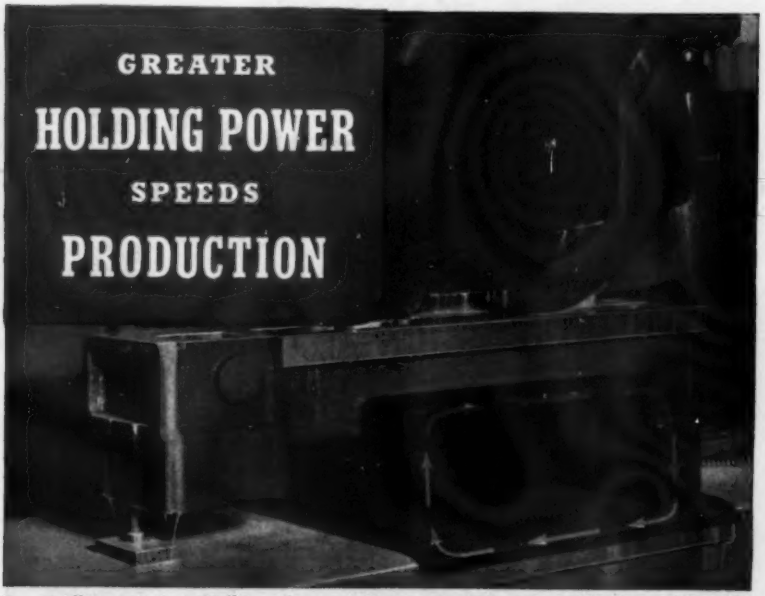
USE IT FOR

- Grinding Off Welds
- Finishing Dies
- Wire Brushing Scale from Pipes
- Snagging Castings
- Cleaning Metal
- Sharpening Tools
- Finishing Propeller Blades
- Drilling In Wood, Stone, Concrete, Steel
- Polishing and Buffing

MALL TOOL COMPANY

7742 SOUTH CHICAGO AVE., ● CHICAGO, ILLINOIS

★ ★ Manufacturers of Portable Electric Saws, Drills and hundreds of other portable power tools and attachments.



Powerful "Magnetic Body Flo" (in red) securely locks work, chuck and parallel to the working table.

● The ANDERSON & BROWN Magnetic Chuck goes beyond the limitations of the conventional chuck which uses "skin" or surface magnetism. It presents a new and extremely desirable method of holding work.

"Magnetic Body Flo" is the principle involved in holding work with the ANDERSON & BROWN Magnetic Chuck. The magnetic flux flows through the work, the parallel and back to the chuck through the working surface of the grinder, locking all elements tightly together.

The necessity of special holding devices is greatly reduced. Its adaptability, flexibility and intense holding power eliminate in many cases these special fixtures.

Discover how the quick set-ups and other advanced features of this chuck can save you time and money. Send for your copy of "Magnetic Chucking Revolutionized".

SEND ME "MAGNETIC CHUCKING REVOLUTIONIZED"

NAME

ADDRESS

CITY STATE

ANDERSON & BROWN CO.

2034 East 22nd Street Cleveland, Ohio

STOP PAYING HOMAGE TO OBSOLESCENCE

INSTALL *Avey* DRILLING and TAPPING MACHINES

The extra precision . . . extra quality . . . extra service built into AVEY machines are the very things to wipe out excessive obsolescence penalties along the production line . . . and to meet modern high speed production requirements. Compare AVEY features point for point for a full appreciation of what they mean in lower drilling and tapping costs. Write for illustrated and descriptive literature.

THE AVEY DRILLING MACHINE CO.
CINCINNATI, OHIO

1 Motor-Avey for intensive high speeds. 2 Motor-Avey Multi for regular production. 3 Avey Motor high duty drilling machine. Belt driven. 4 Speed belt drive No. 2 Avey Drilling Machine. 5 Bench Type Motor-Avey for intensive speeds.

1/4" to 5/16"

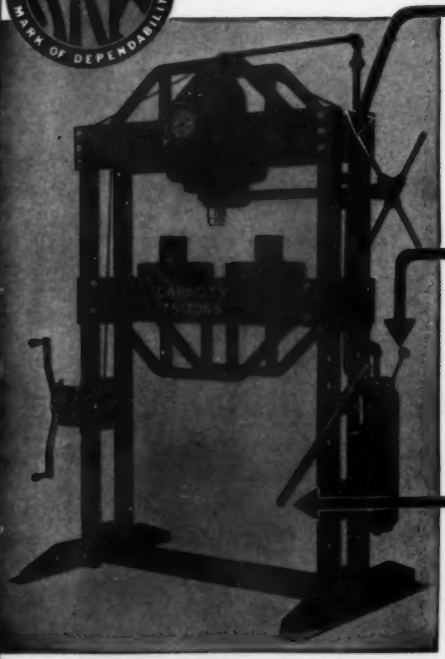
Avey

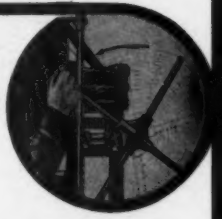
DRILLING MACHINES

BUILT TO DO THE JOB FASTER AND BETTER

Here's how SPEED is built into HYDRAULIC ARBOR PRESSES

SINCE 1916 KRW A MARK OF DEPENDABILITY





1 SPIN THE HAND-WHEEL and the ram speeds to the work by fast mechanical action instead of slow, laborious hydraulic pumping.

2 FLIP THE BALL ARM to close the valve instead of slowly turning a hand-wheel type control.

3 START PUMPING and immediately get tons of pressure on the work because the hydraulic cylinder was automatically filled with oil during operation No. 1.

● The new KRW Presses are designed for SPEED...*speed* in bringing ram to the work...*speed* in developing hydraulic pressure...*speed* in raising ram to remove the work. The "capstan" type handwheel raises the ram with the same mechanical speed employed in lowering it.

A *Two Speed Pump*, controlled by a quick, half turn of a finger lever, enables operator to select the speed best suited to the job—the double plunger action is 2½ times faster than the single action. Write for bulletin describing 25, 50 and 75 ton presses—priced from $198.00*.

*Prices F. O. B. Arcade, N. Y. Slightly higher west of Rockies

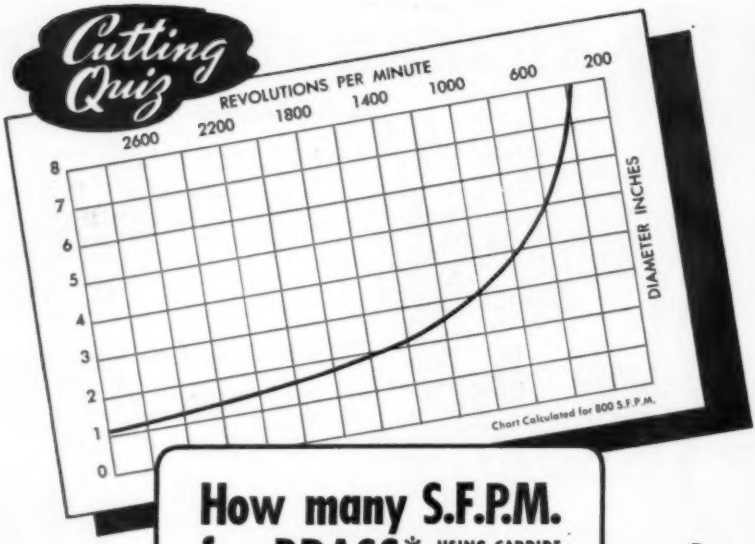
K. R. WILSON

MAIN OFFICE: LOCK ST., BUFFALO, N. Y., U. S. A.
EXPORT OFFICE: 90 WEST ST., NEW YORK, N.Y., U. S. A.
WEST COAST: Osborne Mach. Co., San Francisco, Calif., U. S. A.
Smith-Booth-Usher Co., Los Angeles, Calif., U. S. A.

MAIL THIS COUPON

K.R. Wilson, 27 Lock St., Buffalo, N.Y. Please send Hydraulic Arbor Press Bulletin No. 27.

Name .....
Address .....
City ..... State .....



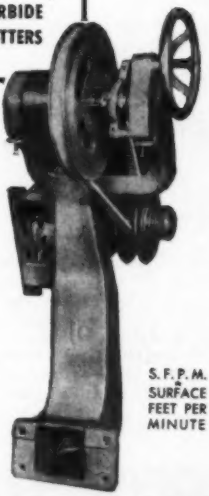
How many S.F.P.M. for BRASS* USING CARBIDE TIPPED CUTTERS ?

Cutting speeds for brass* vary from 600 to 1,000 surface feet per minute, depending upon feed and depth of cut. Consequently, top spindle speeds on old tools are not sufficient for average diameter cutting efficiency...unless provision is made for *increased r.p.m.*

Here's where GIVEN can help you! The Given Vari-Speed Drive adds 30% more revolutions to present available speeds—and, equally important—retains the useful slow speeds too! Investigate the GIVEN—it's engineered to fit any machine tool and is available from 1 to 10 h.p.

Send us a list of your tools—get recommendations, comments and quotations. No obligation.

*COMMERCIAL 85-5-5



S. F. P. M. SURFACE FEET PER MINUTE

Given VARI-SPEED DRIVE

GIVEN MACHINERY COMPANY • 3857 SANTA FE AVE., LOS ANGELES, CALIF.

NEED MOTORS FOR WAR WORK?

4 things to do to get them quicker

YOUR AID ON THESE 4 POINTS WILL HELP US PRODUCE AND DELIVER MORE MOTORS FOR THE WAR EFFORT

SPECIFY [illegible] MOTORS

Tri-Clad motors are available in a full range of sizes from 1 to 100 hp. Your General Electric representative can supply complete information and help you get the Tri-Clad motor to do your job. *General Electric Co., Schenectady, N. Y.*

GENERAL ELECTRIC

Use standard, open, sleeve-bearing motors whenever possible

The standard Tri-Clad motor, though classed as an "open" motor, is so well protected that it gives good service on many jobs where special motors often were recommended.

Sleeve-bearing motors often can be supplied more readily than ball-bearing types because of the present demand for ball bearings on other war equipment. Use ball-bearing motors only where load or mounting conditions require them.

Special end shields and other modifications may result in delay for you and others.

Consider the use of standard or multispeed a-c motors in place of d-c motors wherever this alternative is possible.

order motors early . . . giving complete specifications

Place motor orders when you order the machines they are to drive.

If you are planning motor drives for conveyors or other equipment for new plants, place the orders as soon as design work indicates the motor requirements.

Avoid delay and mix-ups by giving complete specifications, preferably on an order form which your G-E motor representative can supply.

give complete priority information, properly endorsed

The filling of many motor orders is delayed because of incomplete priority information. If in doubt about details, call the nearest G-E office.

When placing orders for motors, be sure that complete priority data accompanies each order in the form of certificates, endorsements properly signed, etc. The priority is not effective in scheduling shipment until it is received by your supplier.

Your needs and the war effort are best served by using the proper priority rating assigned by the War Production Board for the job involved, and requesting delivery no earlier than actually required.

Under the Production Requirements Plan, builders of motor-equipped machines for subsequent sale may order their requirements in advance.

check with G.E. for delivery from local warehouse stocks

To meet urgent war needs, a supply of standard Tri-Clad motors is maintained at G-E factories and local G-E warehouses. Perhaps the motor you want, or can use with a few simple changes, is available for immediate shipment.

Your local G-E motor representative can furnish information on motors which may be in stock in nearby cities.

BERKELEY

RAPID PRODUCTION DRIVES

FOR MAXIMUM OUTPUT - DEPENDABILITY - LOW UPKEEP

New machine tools are scarce yet the war effort demands more and more production. That means maximum output from the tools that are available.

The first step in this direction is more efficient motorization—with BERKELEY DRIVES—which give just the right speeds for the latest carbide tooling, enabling older machines to surpass their best previous performance.

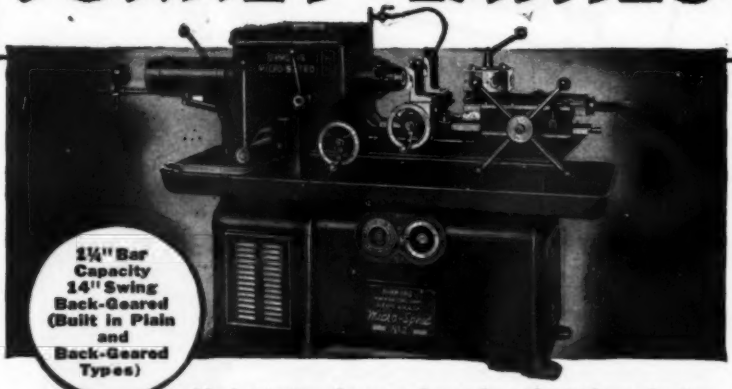
BERKELEY makes a drive for every type of machine tool. Each BERKELEY Drive is made specifically for the tool on which it is to be installed. When you consult BERKELEY you are dealing with a Pioneer Drive Specialist—and there's no charge or obligation for engineering recommendations. *Let us send you Bulletin 50.*

Berkeley

EQUIPMENT COMPANY

CORRY, PENNSYLVANIA

HIGHER PRECISION
FASTER
with these *Selector Dial Control*
TURRET NO. 2 LATHES



Mechanization for war demands unlimited production of a myriad of precision parts in record-breaking time. This problem, further complicated by the ever-growing shortage of skilled workers, can be overcome with modern, sturdy, simple-to-operate tools.

Simmons No. 2 Turret Lathes answer these requirements fully. They produce close tolerance work *speedily and economically*, with a minimum of confusing devices. For example, the Micro-Speed Drive offers unlimited speed variations and all changes can be made while the spindle is in operation. This enables quick selection of the speed best-suited to the work and cutting tools. A simple oversized brake brings the spindle to rest quickly.

Write TODAY for descriptive bulletin detailing other features and complete specifications. Our delivery schedule is reasonably quick!

SIMMONS MACHINE TOOL CORP.
1725 NORTH BROADWAY, ALBANY, N. Y.

SIMMONS
MICRO-SPEED
LATHES · TURRET LATHES · MILLERS · BORING MACHINES

With this NEW

PORTER-CABLE 7" Metal SHAPER

Up to 3/16" CUT with .004" feed at 80 strokes per minute

Given reasonable operator skill and a machineable metal, this shaper will make a 3/16" cut with a .004" feed at 80 strokes per minute. That's probably not its full capacity, but it is **faster than most,** and more than you'll usually ask from a shaper of this size.

The roller-chain drive distributes the strain and wear over five sprocket teeth at a time. There's no gear backlash. No gear marks on the work. No chatter. The extra-heavy cast iron crank-pin-plate acts as a flywheel, storing energy for an easy, powerful cut with minimum shock, vibration and strain on the machine. You get finer precision on key ways and other jobs where precision is important.

Porter-Cable's exclusive Micro-set ram is quickly and accurately adjusted, saving set-up time. The "Anyspeed" control gives speed changes from 64 to 175 strokes per minute, without stopping the machine or shifting belts. Tapered locating pins give fine adjustment on the tool head and vise. There are six automatic cross feeds. The head turns 360°. Table traverse is 10½" and vertical travel, 5½".

Revolutionary New Chain Drive Gives Extra Speed and Smoothness

Ask your local Porter-Cable man (name in 'phone book) or write for complete data.

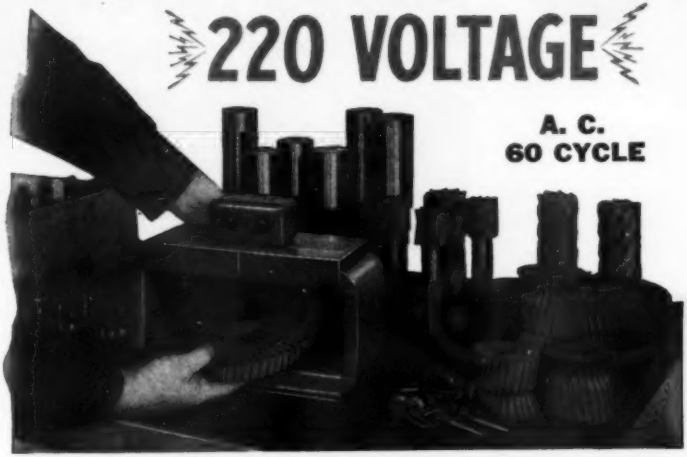
PORTER-CABLE MACHINE CO.
300—7 Exchange St., Syracuse, N. Y.

Welch

QUICK DEMAGNETIZER

220 VOLTAGE

A. C.
60 CYCLE



"Another Welch Product"

INSIDE MEASUREMENTS APPROXIMATELY 4"x11"

A REMARKABLE TIME SAVER

AN outstanding unit needed wherever magnetic chucks are used. Operates on 220 voltage. Any ordinary sized pieces, such as cutters, gears, washers, etc., can be demagnetized by a single pass through its powerful field. Can be easily connected by your own electrician in any convenient location in your plant. Equipped with convenient switch. (If your power is other than 220 volt, 60 cycle, A. C., kindly let us know.) Carried in stock for immediate delivery. 10 DAYS FREE TRIAL IF DESIRED.

Price $120.00

Write for particulars.

Welch INDUSTRIES, INCORPORATED

Makers of High Speed Milling Cutters—Form Tools and Special Tools

20000 WEST EIGHT MILE RD. DETROIT, MICHIGAN

ANDERSON

Power
SCRAPERS

FASTER, EASIER, BETTER WORK . . .

Operator fatigue practically eliminated

The Anderson Power Scraper has a "natural hand control" . . . is as easy to use as a hand scraper. The left hand, as with a hand scraper, serves as a guide to the blade . . . the right hand controls the stroke. Pressure of the left hand controls the depth of the cut, but the forward cut requires no backbreaking labor. A slight forward pressure on the cylinder with the right hand starts the swift, smooth forward stroke which can be regulated from nothing to 3½ feet . . . 60 ft. per minute, reverse speed 90 ft. per minute. The operator can work at a steady rate without tiring as the ¼ h.p. motor does the heavy cutting. With this machine one man can do the work of several.

The Anderson Power Scraper, mounted on an elevating truck, can be easily moved to any location. The machine may be plugged into any handy electric lamp socket and be ready for use. In the scraper housing directly across from the motor is a scraper blade grinder . . . a convenient, speedy means of resharpening scraper blades without leaving the machine.

Write for Complete Information

ANDERSON BROS. MFG. CO.

ROCKFORD, ILLINOIS, U. S. A.

KEMPSMITH and INDUSTRY

MUTUALLY MILLING for VICTORY

For Toolroom and general product
work the new KEMPSMITH TY
"G" All-Geared MILLER (plain
universal) has centralized cont
18 speeds and feeds (ball bear
speed, feed and spindle assembli
Knee Gib, Unit Construction, Mot
in-Base . . . and other features t
make it precise and reliable, econo
ical in first cost, fast and efficie
for PRODUCTION NOW!

PRECISION

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Experience

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WISCONSIN

ANDERSON

Power SCRAPERS

FASTER, EASIER, BETTER WORK . . .

Operator fatigue practically eliminated

The Anderson Power Scraper has a "natural hand control" . . . is as easy to use as a hand scraper. The left hand, as with a hand scraper, serves as a guide to the blade . . . the right hand controls the stroke. Pressure of the left hand controls the depth of the cut, but the forward cut requires no backbreaking labor. A slight forward pressure on the cylinder with the right hand starts the swift, smooth forward stroke which can be regulated from nothing to 3½ feet . . . 60 ft. per minute, reverse speed 90 ft. per minute. The operator can work at a steady rate without tiring as the ¼ h.p. motor does the heavy cutting. With this machine one man can do the work of several.

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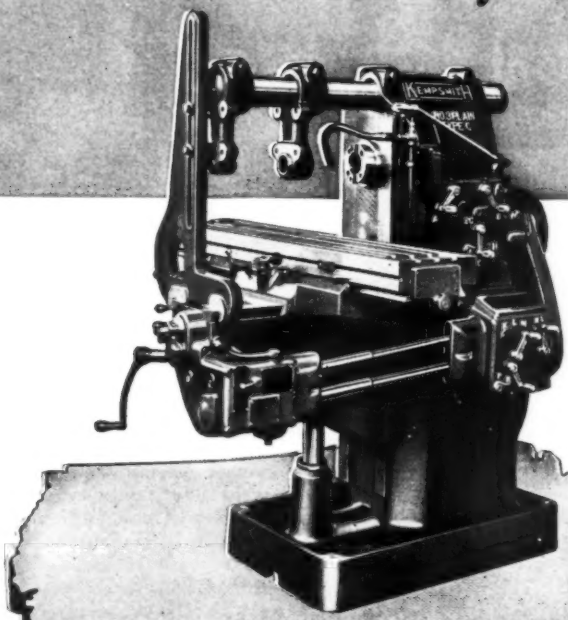
Write for Complete Information

ANDERSON BROS. MFG. CO.

ROCKFORD, ILLINOIS, U. S. A.

KEMPSMITH *and* INDUSTRY

MUTUALLY MILLING *for* VICTORY



For Toolroom and general product work the new KEMPSMITH TY "C" All-Geared MILLER (plain universal) has centralised contr 18 speeds and feeds (ball bear speed, feed and spindle assemblie Knee Gib, Unit Construction, Mot in-Base . . . and other features t make it precise and reliable, econo ical in first cost, fast and efficie for PRODUCTION NOW!

You AS USERS

and WE as PRODUCERS

PRECISION

MILLING MACHINERY

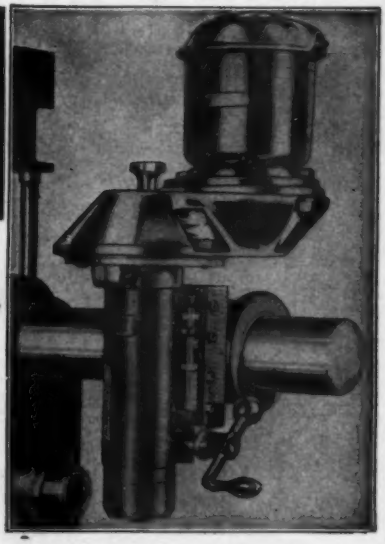
Experience

KEMPSMITH MACHINE CO.

MILWAUKEE • WISCONSIN

HALCO
Universal Head
Speed - Accuracy - Dependability

FOR **HIGH SPEED** MILLING, DRILLING, BORING AND COUNTER BORING ON ANY ANGLE



The Halco Hi-Speed Universal Milling attachment is designed to meet the demand for greater efficiency, better workmanship, and for speed in building tools, dies, jigs, fixtures, wood and metal patterns, and other machine products where accurate and fast machining are of prime importance.

With its 4 inch vertical travel, many drilling, milling, boring and facing operations can be accomplished in one setup. The total weight is approximately 90 pounds, and it can be easily mounted by one man.

The Halco Head is engineered and built to precision limits in a modern shop by skilled mechanics. All parts and materials built into this machine are the very best obtainable and unconditionally guaranteed for six months.

Motor of heavy duty type, 1/3 H. P., 110 volts, 60 cycle, with plug-in cord and switch. Easily reversible for L. H. cutters. Five speeds 350 to 2900 R. P. M. Also 10 speeds 125 to 2900 R. P. M. available at extra cost.

Prompt Delivery Can Be Made

Sold direct, factory to you, or your nearest dealer. Many machines in use. Tried and tested in machine plants for 2 years. Each head is unconditionally guaranteed for six months.

Write for folder giving details or order now for quick delivery.

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14230 BIRWOOD AVE., DETROIT, MICH.

Tannewitz VARIABLE SPEED BAND SAWS

instantly adjustable to the IDEAL speed for cutting metal of EACH and EVERY Type!

In cutting off gates and risers from castings of various metals, practically any size, in cutting steel sheets up to ¼-inch thick, cast iron, plastics or any one of dozens of other cutting operations, a TANNEWITZ Variable Speed Metal Cutting Band Saw will do it quicker, better and show a handsome return on the investment involved. There are five new models in addition to our regular High Speed Band Saws, including those which handle work as wide as 52 inches, and those with 48 inch clearance beneath the guide. Get a line on the TANNEWITZ metal cutting band saw that fits your particular needs. It will save time, step up production and repay its cost dozens of times. Write for full particulars NOW!

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Products Can't Be Beat

. . . for quick, flexible installation

. . . for dependable constant usage

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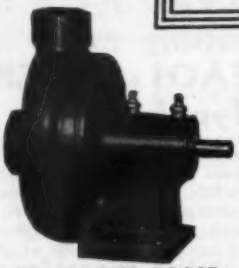
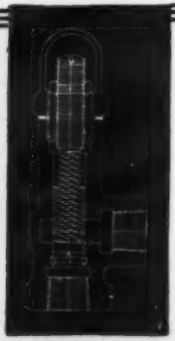


Illustrated: Model AOR

Fulflo **BY-PASS VALVES**



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Belt driven or connected direct to motor. Pumping action at all times regardless of grit or chips. Compact. Well-balanced design and construction.

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NO. 1-VERTICAL MILLING MACHINE

Designed to meet the steadily growing demand. This small, rigid, high-speed vertical spindle Milling Machine embodies all essential features required by the modern tool room, die and mold shop, and production plants. The new CLEVELAND is also adaptable to heavy duty continuous production.

It is a completely new machine, designed and built with all these requirements in mind, by a company whose principle business for 20 years has been creating special machines for high production industries.

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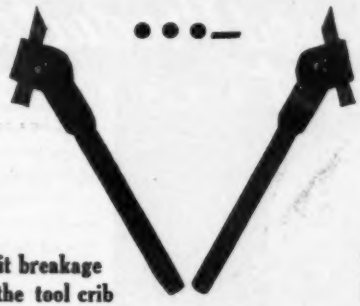

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These saws are designed and built to give long satisfactory service. Rigid castings—oversize New Departure ball bearings—precision construction—statically and dynamically balanced wheels—all controls and adjustments at front, speed up production.

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Equally satisfactory for wood, metal, plastic, etc.

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Day and nite — Racine *High Speed* Metal Cutting Machines are playing a vital part in arming the nation with steady, maximum performances wherever metal cutting is required.

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Lima Electric Motors, Lima Gearshift Drives and Lima Magnetic Polishing Lathes, have proven themselves on the War Production Front.

In addition to simplicity of design and ease of installation, Lima's are engineered to meet the War Production Board's constantly increasing demands on production machines in your plant. Lima engineers, aware of today's vital speed requirements, are at your service - consult them on any questions of motorizing your production equipment. Proven engineering recommendations are at your disposal . . . Keep War Production up with LIMA ELECTRIC MOTORS . LIMA GEARSHIFT DRIVES . LIMA MAGNETIC POLISHING LATHES

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You can be sure of good results only when ou are sure the high temperature heat treat- g furnaces you specify will answer as many these questions as are crossed off as being nswered by Upton".

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itting or washing occur? *No**

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change un-even? *No**

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rain size be incorrect? *No**

atmosphere be determined? *No**

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Upton Electric Salt Bath Furnaces answer but "time" and "temperature" with abso- te certainty. They also answer the mainte- nce question; Upton pots are guaranteed; e power cost problem; Upton furnaces ve upwards of $1200 per year in fuel costs; e delivery problem; Deliveries on Upton rnaces are good!

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We build the furnace using the
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principle of operation
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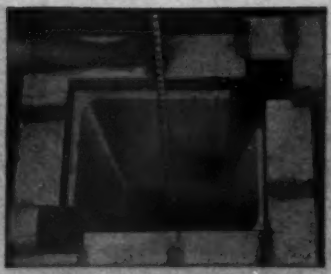
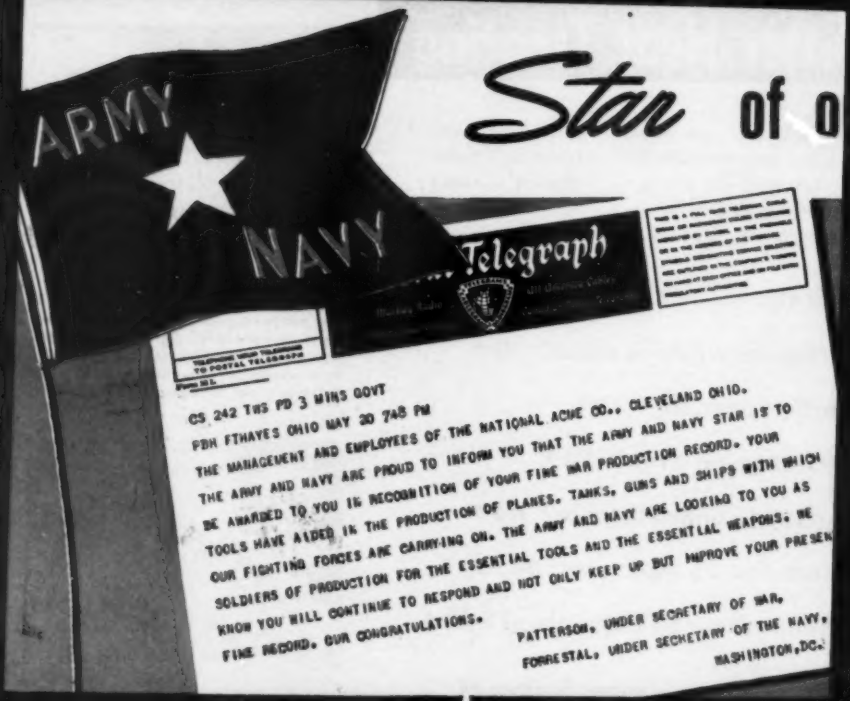


Proper heat distribution in a deep, narrow pot for hardening saw blades is an absolute necessity. Only the Upton design of internal heating that generates heat uniformly everywhere in the pot can really put the heat down there.

CARBURIZER: Sloping rear wall that has brick backing for electrodes clearly indicates increased working space and elimination of salt decomposition due to progressive heating. This furnace is for continuous production carburizing of tank track pins.

ALUMINUM TREATING: This furnace is for treating big aluminum alloy aircraft wing sections. Dotted lines show approximate shape of pot and level of salt. Upton builds them to suit your job.

Star of O



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THE ARMY AND NAVY ARE PROUD TO INFORM YOU THAT THE ARMY AND NAVY STAR IS TO
BE AWARDED TO YOU IN RECOGNITION OF YOUR FINE WAR PRODUCTION RECORD. YOUR
TOOLS HAVE AIDED IN THE PRODUCTION OF PLANES, TANKS, GUNS AND SHIPS WITH WHICH
OUR FIGHTING FORCES ARE CARRYING ON. THE ARMY AND NAVY ARE LOOKING TO YOU AS
SOLDIERS OF PRODUCTION FOR THE ESSENTIAL TOOLS AND THE ESSENTIAL WEAPONS. WE
KNOW YOU WILL CONTINUE TO RESPOND AND NOT ONLY KEEP UP BUT IMPROVE YOUR PRESEN
FINE RECORD. OUR CONGRATULATIONS.

PATTERSON, UNDER SECRETARY OF WAR,
FORRESTAL, UNDER SECRETARY OF THE NAVY,
WASHINGTON, DC.

AT PRESENTATION ceremonies in NAMCO plant F. H. Chapin, President (center), and M. Bisovsky, local MESA president (left), accepted the award on behalf of their fellow workers. To J. V. Forrestal, Under-Secretary U. S. Navy, and Col. S. E. Reimel, Army-Navy Munitions Board, they pledged continued full support of Nation's war effort.

WORKERS CHEERED compliments on their ach ment by Cleveland's Mayor F. J. Lau (speaking) and by high-ranking Army Navy officers. They went back to jobs with renewed determination to their phenomenal machine and tool duction record which has already incr over 600%.

★ ★ ★ ★ ★ ★

nspiration to even greater effort

Proud now the Army-Navy Star burgee flies over the plant; proudly, too, every man will wear a lapel button denoting his part in the primary job of getting munitions and equipment to men at fighting fronts.

"More Output per Day and More Bonds per Pay" is the slogan at The National Acme Co. Subscriptions via pay roll deductions alone now total over $10,000 per week.

S-BUSTING munitions parts now being made Acme-Gridley Bar Automatics to exact- U. S. Army and Navy specifications. years of successful experience stand hind today's amazing speed, accuracy and operating cost of these machines.

FIB—but at no sacrifice of accuracy—is today's vital war production demand. Acme-Gridley Automatics are meeting the need by sustaining accuracy at fastest feeds and highest spindle speeds that modern cutting tools can safely stand.

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MACHINE PRODUCTS • THE CHRONOLOG • LIMIT SWITCHES • SOLENOIDS • POSITIVE CENTRIFUGE • CONTRACT MANUFACTURING

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HELP WAR-BUSY HANDS GET MORE DONE *faster!*

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If you have problems of production speed (and who hasn't?) ask your distributor to show you, in your own plant, on your own work, how SKILSAW TOOLS can help you.

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Your distributor can deliver most SKILSAW TOOLS from stock or ship promptly from factory . . . for all war-production needs

SKILSAW PORTABLE ELECTRIC **TOOLS**

★ MAKE AMERICA'S HANDS MORE PRODUCTIVE ★

Featured In This Issue

PLASTIC TOOLING is an interesting new development at the Lockheed and Vega aircraft plants. Already it has saved much time in the production of planes. The technique as originated by M. J. Basolo (head of Lockheed's Woodworking Department) involves some new uses of bakery equipment, a shining example of American resourcefulness. Story begins on page 53

TRAINING WITHIN INDUSTRY is the subject of Mr. Mottershead's 5th article on the Human Factors in Morale Building. Step by step, he outlines the approved method of training beginners, emphasizing mistakes and oversights in previous practice. Story commences on page 87

HOW LONG do Burring Operations require in your plant? A lot depends on the methods employed. M. C. Pecsok of the Engineering Department of Osborn Mfg. Co., Cleveland describes the latest equipment available for the purpose on page 117

THREAD GRINDING with Electrical Control is by Lee M. Davis of the Engineering Dept., Jones & Lamson Machine Co., Springfield, Vermont. Mr. Davis' story is based on material presented at the 1942 Westinghouse Machine Tool Forum, and appears on page 127

LIGHTING MAINTENANCE is an important topic these critical days with so many plants operating around the clock. The suggestions offered by Westinghouse Lighting Engineers will help to sustain lighting levels with minimum kw hours. See page 141

SANDING Away Production Bottlenecks is by Carleton Cleveland and the 2nd of a series of stories on versatile portable sanders. He presents and describes a number of interesting types on page 151

EATING to Win the War is by John E. Ryckman of the Regional FWA staff. Just as an army "marches on its stomach," fighters on the industrial front must have nourishing food if they are to continue breaking production records. See page 163

BONUSES Build Employee Morale is an interesting tale of farsighted business management, based on the policies of President J. F. Lincoln of Lincoln Electric Co. See page 173

HEAT FAG—and a method of combatting it will be found on page 179

NATIONAL EMERGENCY STEELS describes new alloys containing a minimum of strategic elements on page 188

WELDING as a Production Aid is the theme of Mr. Westbrook's article on page 199

"LET'S TALK SHOP" presents a review of marking devices for many industrial purposes and several helpful shop hints in the section beginning on page 209

"TOOLING-UP for Victory" offers the monthly parade of new tools, new equipment and new ideas for our all-out war effort. See page 229

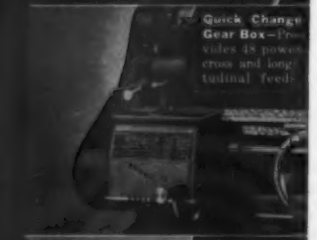
SUBCONTRACTING — Additional Plants with idle tool capacity. See page 239

SEMI-AUTOMATIC Milling Control —An interesting new method of speeding connecting rod production.....242

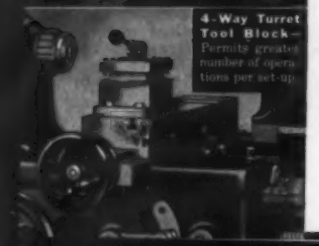
ALTERNATE MATERIALS—By C. C. Struever, describes practical methods of conserving scarce material....244

"MECHANICS Through the Ages" is The Blue Book's exclusive picture page 327

Universal Carriage—Cross slide has front and rear tool blocks and adjustable stops.



Quick Change Gear Box—Provides 48 power cross and longitudinal feeds.



4-Way Turret Tool Block—Permits greater number of operations per set-up.

SOUTH BEND TURRET LATHES

Designed for the efficient production of duplicate part the South Bend No. 2-H Turret Lathe has the precisio for exacting, close-tolerance operations—smooth pow for producing a fine finish—versatility that reduces s up time to a minimum.

The universal carriage has 48 power cross feeds, power longitudinal feeds, and 48 thread cutting feeds. A changes are made through the quick change gear bo The ram-type turret indexes automatically and has adjustable feed trip and stop for each of the six turr faces. The quick change gear box provides 48 chang of turret power feeds. Change gears in the turret apr provide an additional change of turret power feed, ind pendent of universal carriage feeds in both rate and rection. Full advantage can be taken of the higher cutti speeds possible with tungsten carbide tools as a res of the wide range of available feeds and speeds.

Investigate the possibilities of South Bend Turr Lathes, especially for second operation work.

SOUTH BEND LATHE WORKS

Dept. 190, South Bend, Indiana

Lathe Builders For 35 Years

As The Editor Sees It

ALREADY, American fighting men have repeatedly blasted the fabled invincibility of the Jap navy.

Russia has astonished everybody (Hitler included) by standing off the Nazi hordes for a full year.

The Rhineland has had a sample of mass bombings (which they originated).

Inadequately equipped Chinese armies are fighting bravely.

But the recent set-back at Tobruk shows we must be on guard constantly against undue optimism.

Each event, in proper perspective, must be fitted into the master pattern of the entire war.

We must expect good news and bad. We cannot afford any let-down in our efforts until victory is in sight. To speed that day, we must boost production to higher and still higher levels.

We must try to be patient under the increasing pinch of shortages and restrictions. Our job is to put the tools in the hands of our fighting men. General MacArthur has said that if we give our boys the weapons, they'll take care of all the fighting.

Until that job is finished we must strive for the utmost production from the machines we have; sustain the quality of the workmanship and prevent waste of materials and man-hours.

Wesley G. Paulson

Switch to NE Alloy Steels to Save Critical Metals

TO HELP conserve nickel, chromium, vanadium and other scarce metals, the War Production Board's ablest metallurgists have developed NE (National Emergency) Alloy Steels. These new steels contain relatively small quantities of alloying elements in such combination as to produce physical properties usually attributed to steels of much higher alloy content. The War Production Board stipulates the use of the new NE Alloys to *replace* the Standard SAE and AISI Alloy Steels for a wide range of applications.

Ryerson NE Alloy Steel stocks in six specifications, all fine grain, will be available shortly; and will consist of sizes ranging from ½-inch to 7-inch rounds, in three groups:

Carburizing Grades	*Medium Hardening Grades*	*High Hardening Grades*
NE 4023 and NE 8620.	NE 4042 and NE 8744.	NE 4047 and NE 8749.
To Replace AISI and SAE	To Replace AISI and SAE	To Replace AISI and SAE
Nos. A2300, A2500, A3100	Nos. A2330-35, A3130-35	Nos. A 2300, A 3100, A 3200,
A4100, A4600, A5100, A6100.	A4130-35, A5130-35, A6130-35.	A 4100, A 4600, A 6100.

Only limited data on heat-treatment response or physical properties will be available when NE Alloys are first ready for shipment. The WPB is anxious to know how these new steels will function and requests all NE Alloy users to report results in working with these new steels. Ryerson will cooperate fully with users, supplying laboratory test data, and all other available information.

***If you now use Alloy steel,* let Ryerson help you in adapting NE Alloys to your requirements wherever possible. Write, wire or phone the nearest of the ten Ryerson plants.**

Joseph T. Ryerson & Son, *Inc.*, Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo, Boston, Philadelphia, Jersey City

RYERSON STEEL-SERVICE

Plastics in Aircraft Tooling

By GEORGE A. FAIRMAN

THE anticipated shortage of metals prompted a recent investigation of the possibility of using plastics for tooling in aircraft. As a result, the Lockheed and Vega Aircraft Corporations in the past few months have begun producing tools made of plastics, both for drill jigs and forming dies that will stand up to 8000 pounds pressure per square inch under the hydropresses.

In this development, it is interesting to note that many hours, in some instances even months, are being saved in vital warplane production by the ingenious use of the lowly walnut shell, which the housewife ordinarily tosses into her garbage pail, and by bringing right into the aircraft factory, an ordinary baker's bread mixer and cookie oven. Thus, in America's all-out war effort, we find on the production line, each contributing something in his own peculiar way, "the butcher, the baker, the candlestick maker."

This investigation was started by M. Basolo, Foreman of the Lockheed Wood Shop, and has been carried forward along slightly different lines at Vega by Carl Hill of Plastic Tool Development. The Production Research group assisted in later developments.

It was Mr. Basolo's idea (which has been described by him in a patent disclosure) that drill jigs could be fabricated by securing the drill bushings to the master part, placing the part in a form, and pouring a molding of ma-

A — Plastics are now being used for drill jigs and forming dies at the Vega Aircraft plant. In the first trial, they are reported to have saved months of tooling time in building Flying Fortresses. Left to right the group includes Ivan Hicks, Vega Wood Shop Foreman; Carl Hill and John McCauley of Plastic Tool Development.

B—Lee Brown of Vega's Plastic Tool Shop shows how the resin is drawn from the barrel containers into the mixing vat which is mounted on scales. Measurements are computed by weight.

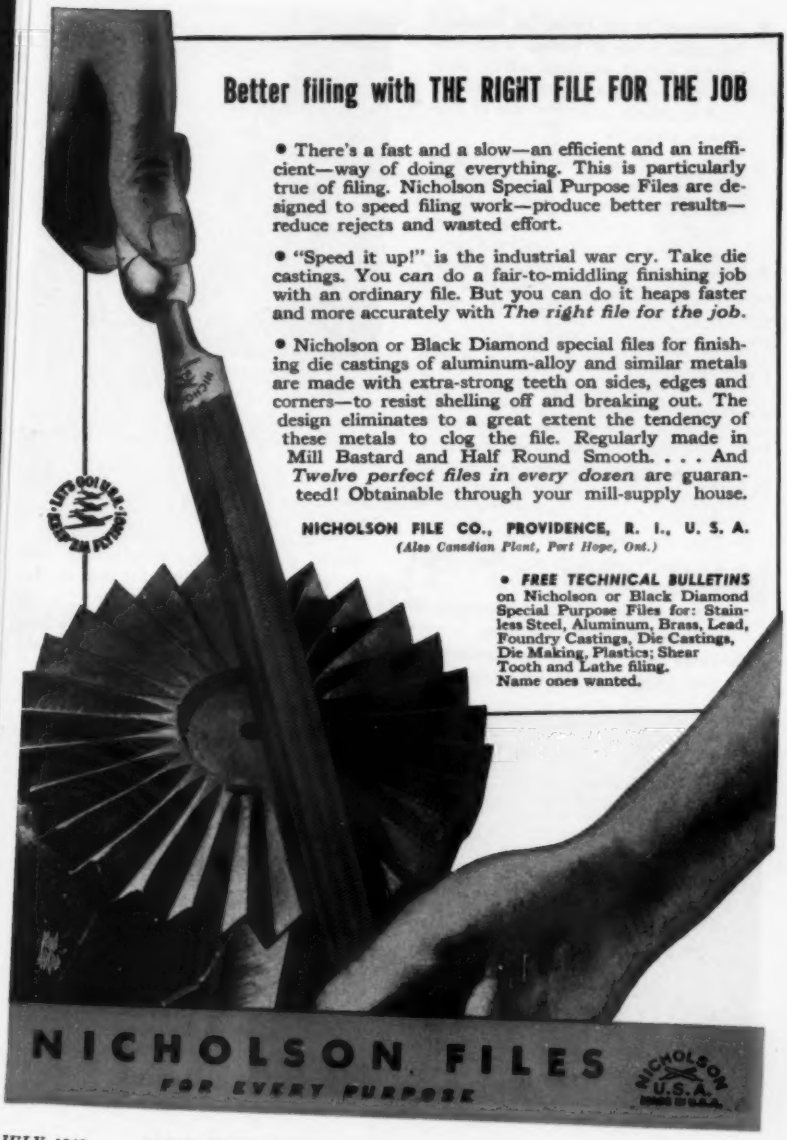
terial around it. When the material has solidified in conformity with contour of the part, bolts holding the bushings in position can be removed, and the jig then finished for use.

Reason for this investigation is that the present method of drill jig construction, using wood with inserted metal bushings, has several disadvantages, viz:

1—The operations involved in creating a 3-dimensional contour in wood are largely manual and hence slow and expensive.

C—The catalyst is mixed with the resin in a standard dough mixer. This catalyst starts the reaction that transforms the liquid into a solid mass.

D—Ground English walnut shell flour is poured into the mixer to serve as a filler by Lee Brown.


Better filing with THE RIGHT FILE FOR THE JOB
• There's a fast and a slow—an efficient and an inefficient—way of doing everything. This is particularly true of filing. Nicholson Special Purpose Files are designed to speed filing work—produce better results—reduce rejects and wasted effort.
• "Speed it up!" is the industrial war cry. Take die castings. You *can* do a fair-to-middling finishing job with an ordinary file. But you can do it heaps faster and more accurately with *The right file for the job.*
• Nicholson or Black Diamond special files for finishing die castings of aluminum-alloy and similar metals are made with extra-strong teeth on sides, edges and corners—to resist shelling off and breaking out. The design eliminates to a great extent the tendency of these metals to clog the file. Regularly made in Mill Bastard and Half Round Smooth. . . . And *Twelve perfect files in every dozen* are guaranteed! Obtainable through your mill-supply house.
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• FREE TECHNICAL BULLETINS on Nicholson or Black Diamond Special Purpose Files for: Stainless Steel, Aluminum, Brass, Lead, Foundry Castings, Die Castings, Die Making, Plastics; Shear Tooth and Lathe filing. Name ones wanted.
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FOR EVERY PURPOSE
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2—Bushings must often be retained by steel nests or straps. This creates a layout problem which adds to the time and expense involved, and requires extensive use of machine tools.

3—The wood is adversely affected by moisture and soluble lubricating oils, and may swell or shrink unless it receives surface treatment and periodic maintenance.

Requirements for a satisfactory thermo-plastic material should be that the material be of such a nature that it:

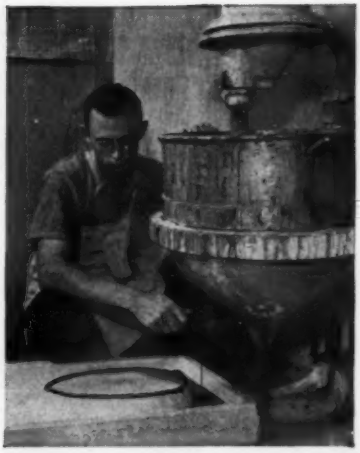
1—Can be cast at 225-325 F with a minimum softening point of 200 F. (These requirements will make it possible to cast the jig in an aluminum alloy part without damaging the latter; and will avoid danger of softening the jig due to heat generated by drilling.

2—Can be reclaimed cheaply.

3—Can be finished on standard wood working tools.

4—Has sufficient impact strength to withstand shop handling.

5—Does not exhibit brittleness at low temperatures or after aging.



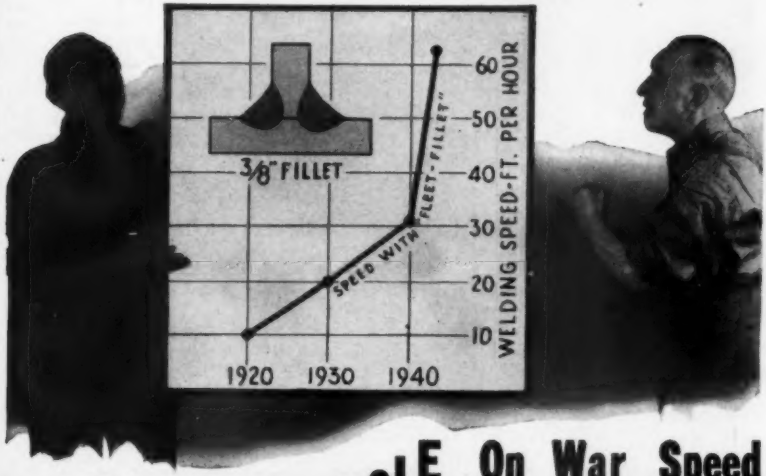
E—Here the plastic resin is poured by Bruce Vinton from a converted dough mixer into a plastic mold. In 3 hours this plastic form will be used as a router block.

6—Is resistant to lubricating oils and metallic chips formed in the drilling operation.

In addition, means for controlling shrink of the molding material should be available.

F—Stuart Benson of Vega's Plastic Tool Shop places mold containing liquid resin in cookie oven where it is cured for from 2 to 8 hours, according to its size. The closely controlled temperature is 175 F.

then I said to myself—



Here's a NEW ANGLE On War Speed

Look how war industries can step up welding output with the new "Fleet-Fillet" Technique!

ALTER EGO: Looks like arc speeds of 30 feet per hour have been increased to 65 feet per hour for a 3/8" fillet overnight. That's more than 100 percent. How it could it be possible?

According to Lincoln it's simply a matter of selecting the right electrode, using the new "Fleet-Fillet" Technique and going like blazes.

ALTER EGO: But isn't that speed tough on the "Man Behind the Mask"?

Not at all. In fact, many welders who have tried this new technique say it actually is easier—causes less fatigue than the old way!

ALTER EGO: Then every American — from the welder to the president—should go for it! Let's see the details in Lincoln's new bulletin "The Fleet-Fillet Technique For Speeding War Production and Cutting Costs." And let's put it work for Uncle Sam without delay.

"Fleet-Fillet" Bulletin 432 free on request.

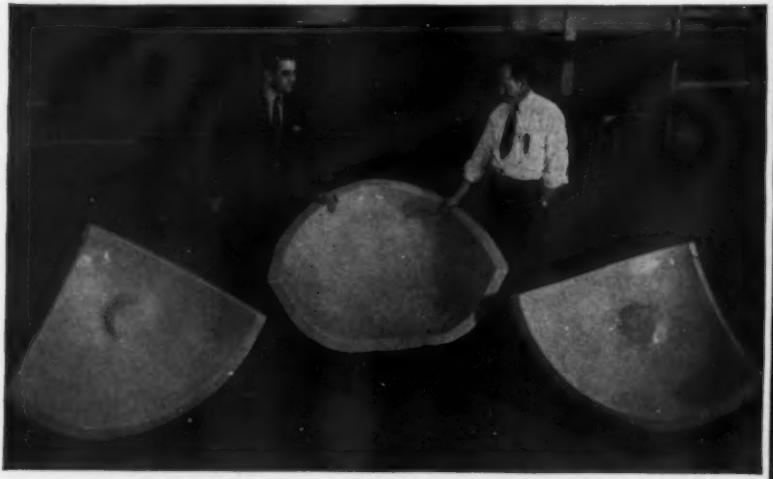
THE LINCOLN ELECTRIC COMPANY
CLEVELAND, OHIO

ALTER EGO: Literally, "one's other self"—the still, small voice that questions, inspires and corrects our conscious action.

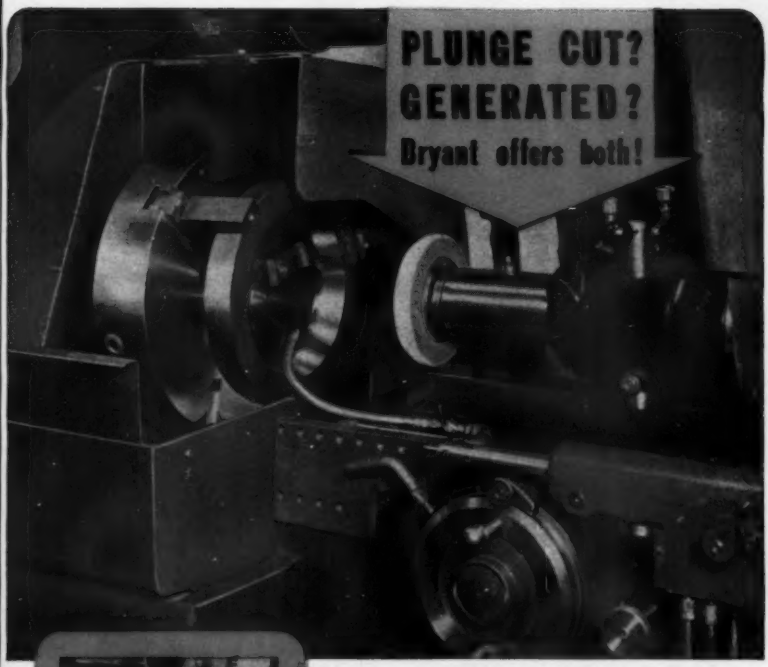
G—Drill jigs such as these, if made of steel or even dural, would be heavy and much more difficult to handle. In view of the mounting shortage of metals, plastics are playing an increasingly important part in our war effort.

Of several materials studied, Lockheed accepted a phenol acetone thermoplastic, while Vega at present is using an acid setting phenol formaldehyde thermo-setting composition which contains a certain amount of glamor for the layman in that it is made up of 25 to 30% ground walnut shell flour, used as a filler with resin and an acid catalyst or accelerator. Other good fillers include wood flour, masonite and scrap plastic.

Plastics were accepted with reservations at first. Gradually, however, such misgivings were supplanted by enthusiasm. Plastics gained in popularity and plastic tools now dot the major and sub-assembly lines.



H—These Vega men are proud of their accomplishment in producing what are said to be the largest phenolics on the coast. The dies were made at a fraction of the cost required by previous methods, and valuable time was saved. Ivan Hicks, Wood Shop Foreman is on the left, and John Hopple, group leader is on the right.



View showing formed guide attached to wheel-slide-suspension No. 16 Bryant Grinder

No. 16-20" Bryant Internal Grinder

THE Bryant principle of overhead wheel slide suspension lends itself to the easy, profitable grinding of dies and similar parts.

A guide is used for controlling the wheel slide traverse to follow the work contour or for controlling the shape of the wheel if the plunge cut method of grinding is preferred.

The first, or generating, method has been favored by many manufacturers of dies due to assurance of smooth blended curves and freedom from rings left by the abrasives.

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Which method will best suit your requirements? Our engineers and field men will gladly help in solving your problems.

BRYANT CHUCKING GRINDER CO.
SPRINGFIELD, VERMONT, U. S. A.

I—Vega sheet metal department operator inspects completed part after being formed under hydropress using a thermo-setting plastic die.

Investigation in the plastic tooling field has brought to light several desirable features of interest to both company and government, whose motives are one and the same, namely:—to produce airplanes more quickly and more efficiently. Among outstanding features are:

1—Plastics may be substituted for steel and dural in many cases.

2—Tools may be cast to a master part or plaster mold more quickly than by forming, milling or hand fitting.

3—Duplicate tools may be fabricated at less cost than the original due to the fact that molds are saved.

4—Duplicate tools may be made economically and quickly for transportation to other plants.

The time factor—a very important item which designers, planners, tool makers and others involved in tooling must give prime consideration at this time—has been one of the plastic exponent's greatest selling points. It is believed at Vega that the portion of their tooling program on the B-17F Flying Fortress which has been completed through the use of plastics, involving 3 months' work, would have required 5 to 6 months if wood, dural and steel had been used. This rep-

J—Vega's Plastic Shop—In the background an ordinary baker's bread mixer is mixing the thermo-setting plastic, while in the right foreground a worker inspects one of his cakes to see if it is cured.

r Scope is an optical locating tool
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resented a saving of vital time since many of the jobs performed during the 3 month period have been those which threatened to interfere with production schedules if not done quickly. Such results were possible because plastics lend themselves readily to casting to a master part.

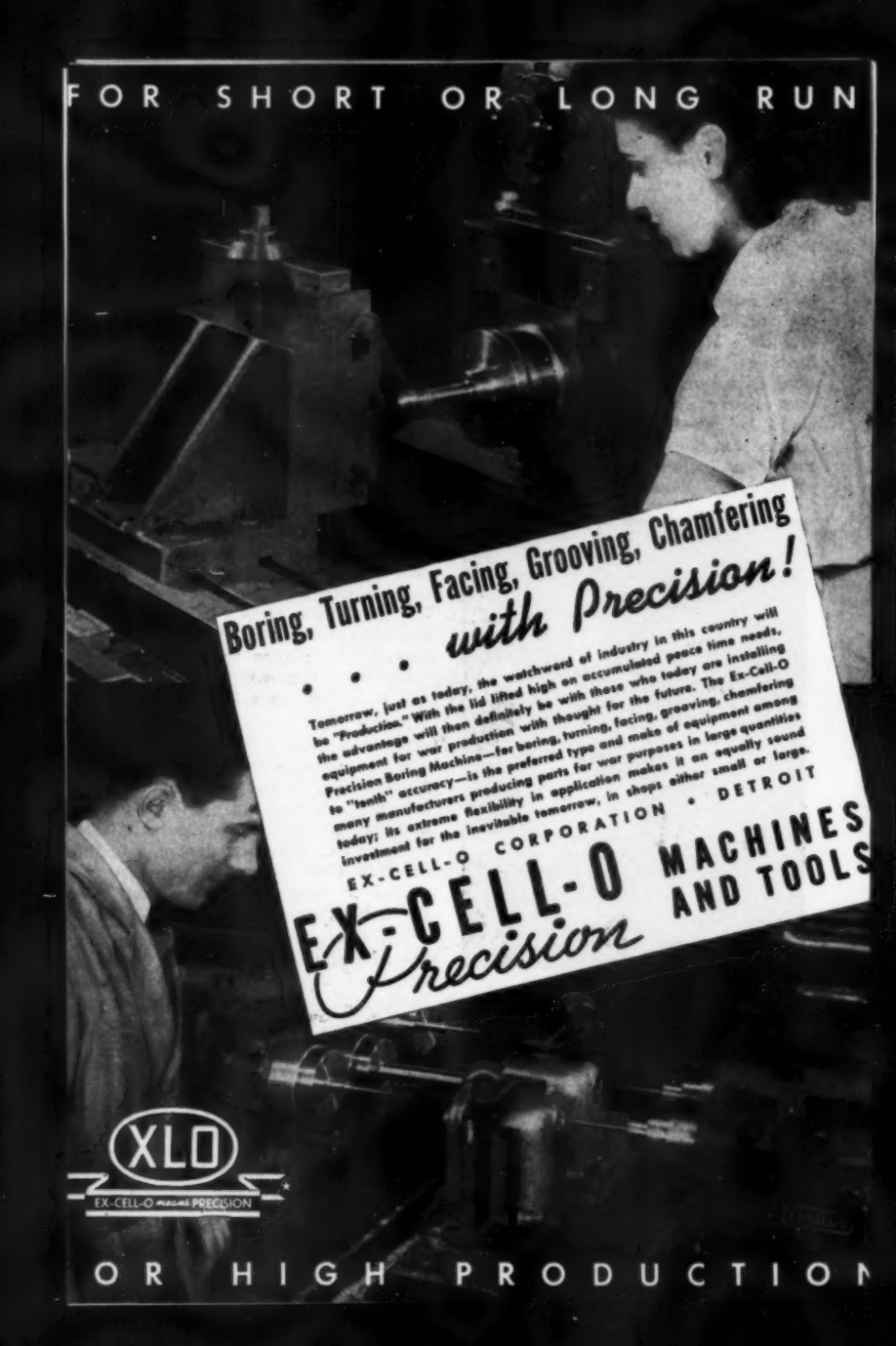
"Vega has conducted experiments and research in both the thermo-setting and thermo-plastic fields," states Carl Hill, of the Plastic Tool Research Section, in a recent report. "However, we will discuss the thermo-setting, cast materials at this time. We have found that plastics are applica-

K—Pouring hot liquid phenol acetone thermoplastic into plaster mold for a Lockheed "Lightning" wing-root fairing drill jig. The group includes (L to R) Leon E. Champer, chemist; Henry E. Diem, pouring and M. D. "Mop" Basolo, Lockheed Wood Shop Foreman who invented new plastic composition for drill jigs and forming dies.

This brings up another important feature. If templates or engineering data are not available, but a master part is available, then not only is time saved in making the actual tool, but there is eliminated the time necessary to obtain this information and to make the templates. In this case, the master part is used by building up the sides to allow for proper thickness of plastic and casting directly to the part. An exact reproduction of the contoured part is obtained by this method, thus eliminating machining, fitting to templates, etc. Techniques have been worked out to allow for part thickness when casting to a part; to allow for part tolerances by making the casting oversize, even when casting to a master part.

ble to drill jigs, formed router blocks, shaper blocks, saw jigs, checking fixtures, hydro form blocks, dies, punch jigs, forming dies for plexiglass; in other words, most jigs that involve contours. We have not found plastics to have any particular advantage on jigs where no contour is involved except from the standpoint of conserving vital materials.

"In cast phenolic drill jig plates, we are unable to cast the bushings directly in the drill plate. Locating the bushings, however, is accomplished quickly and efficiently by casting cerromatrix around the bushings which, in turn, are located to the master part or template by means of pins, oversize holes having been drilled in the plastic plate to accommodate the bush-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ing and cerromatrix. These bushings are especially designed for thermoplastics and are of sufficient wall thickness to eliminate possibility of their becoming overheated and losing their location.

"These bushings, incidentally, are more quickly manufactured because of the fact that only the **inside diameter** is vital. When the quantity of drill bushings used throughout the nation is taken into consideration, the man hours and machine hours that could be saved amount to a startling figure. On one drill jig that we made, there was a saving of $70.11 in the cost of bushings alone. Using this example as a criterion, we have an idea of the possibilities for the future of plastic drill jigs.

L—Milling plastic nesting block at Vega Aircraft Corp.

"Router blocks, shaper blocks, and saw jigs made of plastics have two particular points in their favor. One is that they can be cast to a contour. The other is their natural resistance to the soluble oils used in the fabrication of parts. They do not warp or lose tolerance because of moisture absorption."

With the addition of the acid catalyst to the base resin, Vega is now able to set up and finish the average work in plastics in 8 hours—work that might take from 3 days to 2 weeks by former methods.

For hydropress production tools, where a minimum of 1½" draw can be maintained, applying external beads as stiffeners around lightning holes in flat work, the application of plastic tooling can help speed up production by using 2 or more duplicate tools which are cheap to manufacture and light to handle. The development work can be done with a wood form block and a plaster split mold can be made to this wood form block. In this manner, duplicate tools may be cast out of plastics, the plaster split mold always being saved in event of breakdowns due to rough usage in production.

Plastic will not move under pressure, thus definite mold lines will always be maintained, as long as about 8,000 lbs psi is not exceeded to form any kind of material. The only impact requirements of plastics are that the material withstand dropping to the concrete floor and normal impact incurred in loading and unloading the jig or hydropress.

The tests of early compounds of the phenol acetone thermoplastic resins at Lockheed showed very favorable results, and immediate application appeared feasible at first. However, it was demonstarted that the material possessed definite aging properties which were not desirable. The aging appeared to be due to the crystallization of the excess maracaibo wax which had been added to make the material more inert to soluble oil. This crystallization precipitated wax fracture

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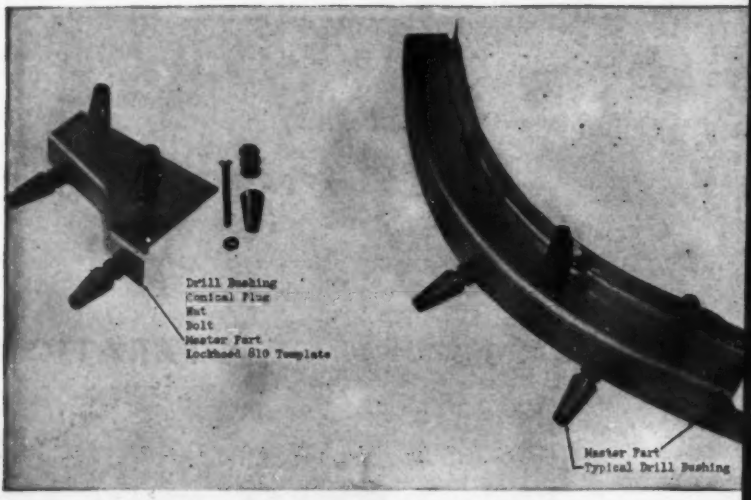

Fig. 1—Molded drill jigs are fabricated from master part templates.

planes. Characteristic needle-like crystals consistently occurred in the fracture plane, being symetrically oriented in the direction of shear.

The problem apparently has been solved by removing the major portion of the maracaibo wax. Inertness to oil has not been adversely affected by decreasing the wax content from 3 to ½%.

Having overcome this first difficulty, the problem was resolved into one of compromising between softening temperature and impact strength. Plastic materials having good impact strength tend to have too low a softening point. However, considerable variation can be obtained by varying the type and quantity of plasticizer used. The first compounds treated with liquid plasticizers had relatively low softening points, so that on very hot days, clamping devices on a drill jig made of these materials would sink into the surface.

A chemical company then succeeded in developing a solid plasticizer whi raised the softening point from 150 to approximately 250 F. The resulti material had excellent casting chara teristics, high softening point, etc., b was unsatisfactory in practice becau of brittleness. Hence, a compromi was reached by adopting a part liqui part solid plasticizer, which result in a blend of resin with the desir properties.

The development of this project h included not only the determination a suitable plastic material, but also t perfection of a technique for fabrica ing the jig using such a material. Th technique has been worked out some detail and is described hereaft both for Lockheed and Vega.

The type of part to which this pro ess is best suited is an open contou with or without joggles. The equi ment required for making the plas drill jigs of the material used Lockheed consists of a jacketed kett

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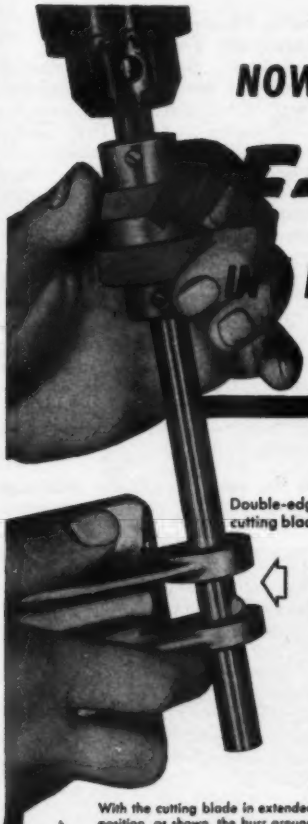

With the cutting blade in extended position, as shown, the burr around any hole may be quickly removed. Sliding the knurled collar upwards retracts the blade to within the diameter of the shaft and the work may be removed or moved to a new position and the blade re-extended.

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equipped with a device for agitating the mixture therein. The jacket on the kettle is for the purpose of containing a liquid bath which may be heated to maintain the desired temperature throughout the kettle. Without such a bath surrounding the kettle, maintenance of uniform temperature is extremely difficult. The only suitable alternative would be use of an electric heating element wrapped around the kettle. The agitating device should not merely consist of a paddle arrangement but should be of such a nature as to continuously scrape the material from the side and bottom of the kettle. This is referred to in the trade as a "full scraper type agitator."

At Vega, the thermo-setting composition is mixed in an ordinary baker's bread mixer and then baked at 175 F in a cookie oven.

Lockheed Phenol Acetone Thermoplastic Technique

Molded drill jigs are fabricated from Lockheed master part templates. The template contains master coordination holes (see Fig. 1). Drill bushings are bolted through the master coordination holes to the template. This assembly is then placed in a retaining form and the plastic material is cast over the part and around the drill bushings. Shrink is controlled by having the retaining form extend above the master part. Hence when the hot plastic first contacts the cold part, it solidifies rather rapidly, freezing to the contour. As the remaining plastic mass progressively solidifies, plastic is supplied from the reservoir created by the retainer, terminating in a sunken surface on top.

When the cast is cool, the retaining forms are removed and the concave

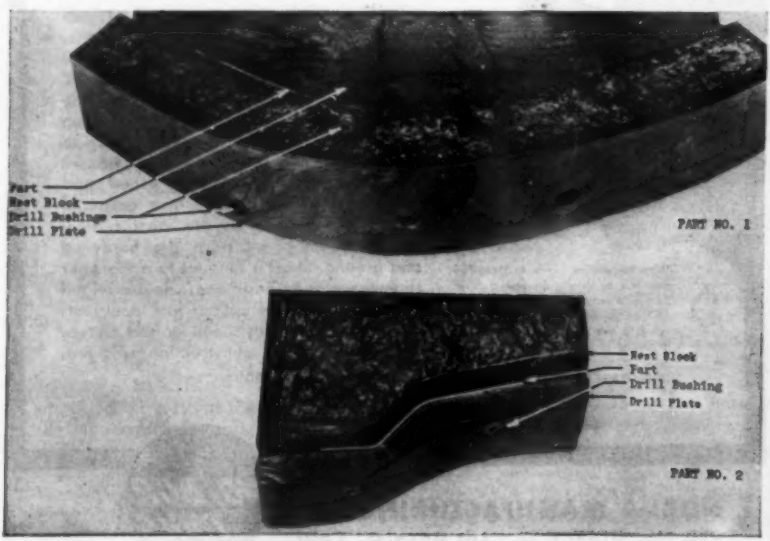
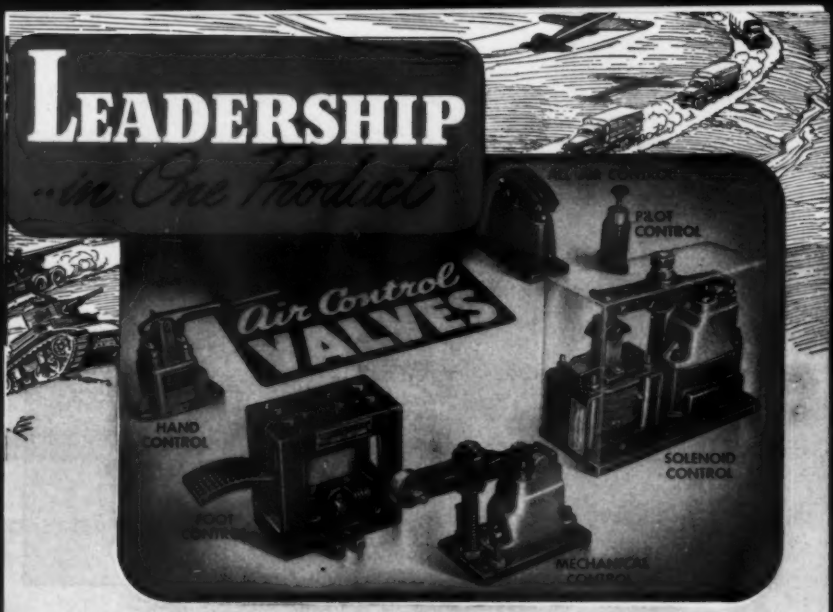


Fig. 2—Assembled drill jigs and parts.



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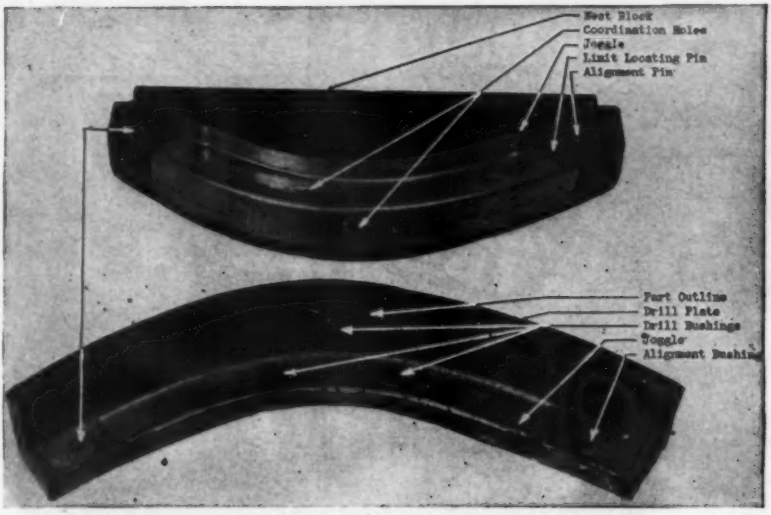

Fig. 3—Open jig and part.

free surface of the block is finished on the joiner until flat. Here the cone-like plugs (Fig. 1) are first removed, making the position of the drill bushings visible. A certain amount of care must be exercised at this point to prevent the joiner blades from striking the drill bushings. In practice the plastic is cut to within ¼ to 3/16" of the external drill bushing face and the hole to the drill bushing is champfered as a finishing operation. Thermo-plastic parts may not be sandpapered, as frictional heat causes gumming. However, a spoke shave or floor scraper will give an excellently finished surface.

To complete the jig, the part is placed between the drill plate and the next block (see Fig. 2) and the assembly clamped together. Alignment of the coordination holes in the part and the drill plate is checked by inserting the proper sized drill rod through the drill bushing and into the coordination holes of the part. This having been verified, the ⅜" holes are drilled through ends of the assembled jig to accommodate the alignment bushing, (see Fig. 3 for position of alignment bushings.) The jig is then unclamped. The alignment bushings, which are serrated about their outer circumference, hold securely when driven into place. The alignment pins are then driven into the alignment bushings in the drill plate and held in place by heating a small amount of the plastic and flowing it into holes on back of the drill plate.

Limit pins are driven into the drill plate at the ends of the master part, or may be placed through the part if it happens to contain pin holes used to locate the part during forming.

In jigs of phenol acetone resin, position of drill bushings may be altered by "drifting." This is accomplished by inserting a torch heated drill rod in

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the bushing, allowing the heat to diffuse momentarily, then applying a force in the desired direction of movement. This will facilitate any alterations required by inspection.

Figures 3, 4, and 5 illustrate typical molded drill jigs in open and closed positions.

If the part from which the drill jig is cast is extremely large, an alternative method of affixing the drill bushings is available. First the drill plate and next block are cast as outlined, except that the drill bushings are not bolted to the master part. When the drill plate has been planed to the lengths of the drill bushing, the master part is nested and holes backdrilled thru template and drill plate. Using the pilot holes, enlarged to a diameter of 1", affix the drill bushings to the master part, nest into the drill plate, clamp, and cast sufficient plastic around the bushings to bond them to the drill plate. Disassemble the bushings from the master part and finish as described in the preceding method.

After inspection the drill jig is ready for service and, given proper treatment, should prove satisfactory for innumerable parts. If the jig becomes damaged or obsolete, it may be returned to the plastic shop where facilities are available to salvage the plastic material and the metallic bushings, alignment accessories, etc.

Vega Phenol Formaldehyde Thermo-Setting Technique

These notes on the practical application of plastics in the tool shop at Vega were prepared by the Tool Research and Development Division of the Vega Aircraft Corporation:

A. MOULDS FOR ALL TYPES OF BASES

1. The advantages of plastic tooling are more pronounced in tools that require fitting to contours than straight surfaces. On formed router blocks, for instance, it is much more simple to make a form using the sample part as part of the form and cast a base

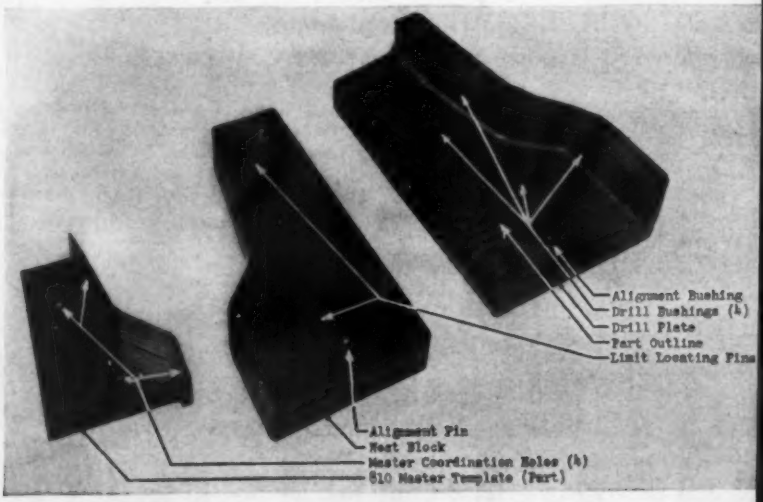
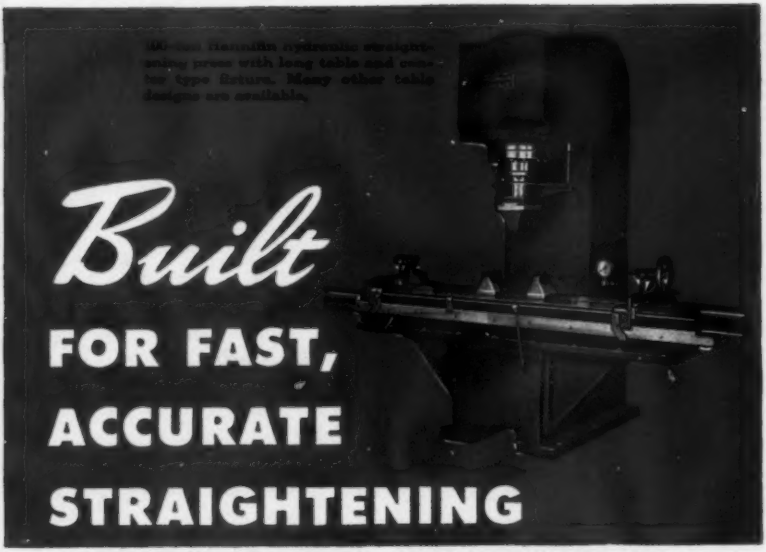


Fig. 4—Typical molded drill jig in open position.



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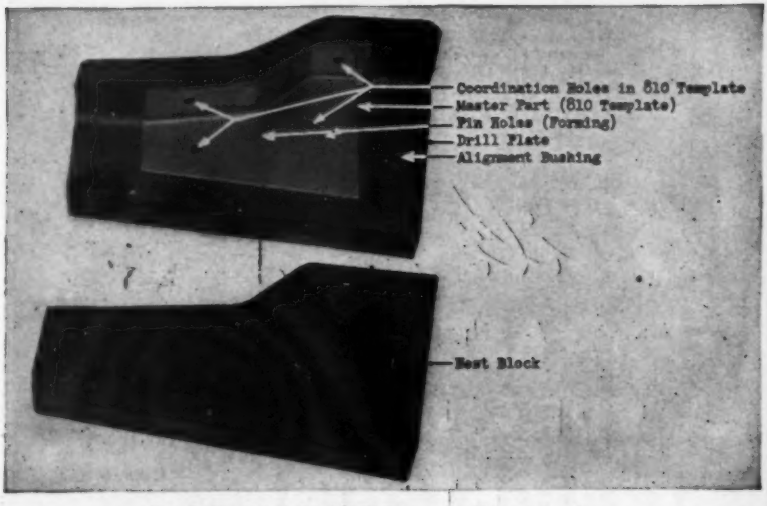

Fig. 5—Typical molded drill jig open with part in place.

rather than blue it in and work it down by hand.

2. These are two methods by which this mold can be made. One is to back up the part with clay or plaster and build the sides of the mold around the part, extending the flanges with plaster to allow a larger base or nesting block than the sample part itself.

3. Another method is to use the sample part as a pattern and make a complete mold from the part. On large castings it is often advisable to use the plaster from which the Kirksite die was made to obtain the contour. When this is done, a splash is made of the plaster, and the sides are built up of wood.

4. It is better to use wood for the outside of molds whenever possible, because wood contains far less moisture than plaster and allows rapid penetration of heat. This insures a cured casting. In many cases the surface that is to be next to the part can be cast on plaster while the outer surfaces can be cast against wood and later sanded.

5. If plaster is to be used entirely for the mold, the volume of plaster should never exceed the volume of the casting. Mold thickness should always be kept to a minimum. The reason for keeping them thin is best explained by the action that takes place. When the reaction between the resin and the catalyst takes place, heat is created. The more volume we have in the casting, the more heat is formed. Thus, in a small casting, only a small amount of heat is created, and the casting is forced to depend on oven heat to finish its cure. If a small casting is encased in a thick plaster mold, it takes oven heat some time to penetrate the plaster. Thus, in many cases, in order to cure the bottom of the casting, it would have to bake so long that the top, which is exposed, would be over-cooked.

6. Molds of any material should be made in such a manner that they can be easily sprayed and then assembled and poured.

B. TREATING THE MOLDS

1. All plaster molds should be treated with one coat of Bayberry wax, let dry and sprayed with at least four coats of clear lacquer, sanding between the last two coats. The lacquer must be thoroughly dry before pouring with plastics.

2. Wood molds should be coated with four coats of clear lacquer, sanding after the first one. The last coat should be absolutely smooth. Regardless of the material used in the mold, the casting will reflect every detail of the mold surface.

C. DRILL JIGS.

1. The procedure outlined for molds holds true for all types of jigs. Drill jig bases fall in the same category as formed router block bases. In many cases it is desirable to use plastic bases and some other form of drill plate.

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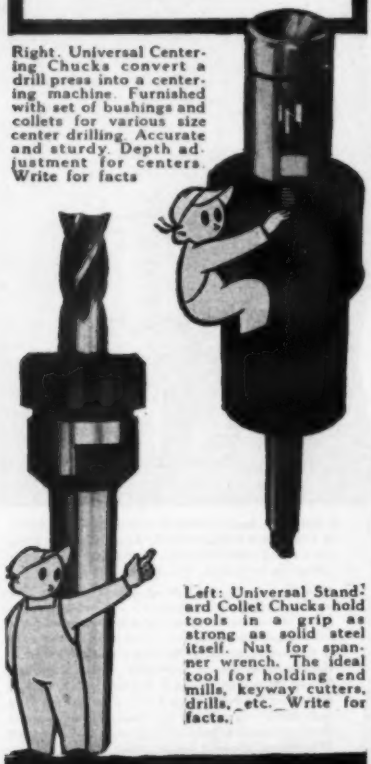


Right. Universal Centering Chucks convert a drill press into a centering machine. Furnished with set of bushings and collets for various size center drilling. Accurate and sturdy. Depth adjustment for centers. Write for facts

Left: Universal Standard Collet Chucks hold tools in a grip as strong as solid steel itself. Nut for spanner wrench. The ideal tool for holding end mills, keyway cutters, drills, etc. Write for facts.

UNIVERSAL
ENGINEERING COMPANY
FRANKENMUTH, MICH.

2. Weight is an essential factor in all tools. Bases should not be under ½" or over 2½" thick. On extreme contours, the bases should be made in the form of a shell. Bases should always be backed up with ½" masonite to absorb the jar in handling and protect the edges. In case of a shell for a base, the shell may be fastened to the base at points of contact.

3. When attaching wood or masonite to plastics, coarse threaded machine screws are recommended. Holes are drilled and tapped as in steel. Machine screws should be as long as possible.

4. When using a thermosetting plastic drill plate, never cast the bushings directly in the plastic. Cast the plate blank and back drill from the sample part or master part, locate bushings and set in cerromatrix. One precaution is vitally important. When pouring the cerromatrix, be sure that it is not too hot, or it will expand and crack the plastic; 300 F is the proper temperature for pouring.

5. No design for plastics should include sharp corners or protruding angles or flanges that may be knocked off or chipped in use. All radii should be as large as is permissible on the particular tool. Outside radii that have no bearing on the function of the tool should be at least ⅜". These may be sanded in some cases. Allow generous fillets. Sharp corners are weak points.

6. Wall thickness should always be ¾" or more. Drill plates that are poured with a constant wall thickness should be poured from one end, baked and left in the mold to cool. Thin sections poured from the flat side will warp.

D. HOLD DOWNS.

1. Any standard type of hold downs may be used, always bearing in mind the fact that when the clamps are closed or tight, the plate should be resting solidly against the base and yet not have the drill plate in a strain.

E. DRILL BUSHINGS.

1. Plastic hex bushings are available and are recommended where space is not cramped. In the event that space is limited, use gang bushings.

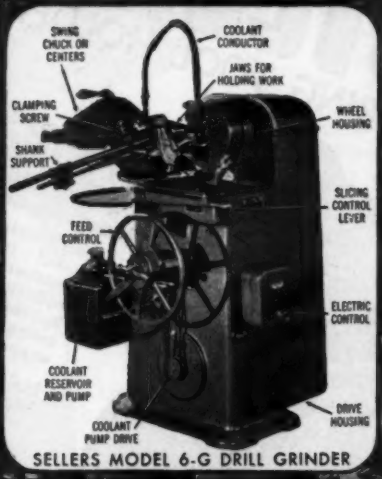
F. MARKING PLASTIC JIGS.

1. Wherever possible, jigs should be stamped on the masonite base. When this is not convenient, and it is necessary to stamp the plastic, it should be done with a rubber stamp using India ink. When the final coat of lacquer is applied, which should be the last operation before inspection on all plastic tools, it seals the ink so that it can not be rubbed off.

G. PLASTIC FORM BLOCKS.

1. All plastic hydro form blocks should be mounted on a masonite base projecting all around the block ½". On blocks that are to be 2" high, the plastic should be poured 1½" thick. On thicker blocks, 1" masonite should be used. Blocks should be standard 2, 3, and 4".

SELLERS DRILL GRINDERS



SELLERS MODEL 6-G DRILL GRINDER

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GRINDS DRILLS AS SMALL AS 1/4"

GRINDS DRILLS AS LARGE AS 3

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Economical and most efficient tool holders. Any number of cutters can be used with the same holder. These holders are adapted to a wide range of work in the lathe, shaper and screw machine.

Holder furnished with high speed steel cutter bl

Forming Tool Holders assure faster, smoother machining, free from cutter marks. One grind only sharpens cutter. Ratchet design prevents cutter from turning under heavy feeds. Key in bottom of holder prevents sidesway. Furnished with hardened wrench and one high speed cutter blank, unless otherwise specified.

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Index Fixture tilted at 30° milling end teeth in Taper Reamer.

Fixture and Base at right angles milling straight teeth in cutter.

Base of Fixture on 30° angle milling end teeth in cutter.

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BURGESS ACOUSTI-BOOTH

2. If a wood pattern is made, it should be made to shrink scale. The shrink of the oil tool resin now being used is 1/10" to the foot. A plaster splash is made of this pattern and the splash used as a mold.

H. MIXING THE RESIN.

1. Mixing of the resin must be thorough. If the catalyst is not well mixed, there may be spots in the casting that will not set up. Also, if the fillers are mixed with the resin before the catalyst, the fillers will absorb some of the catalyst and form lumps of catalyst-filled filler that will not be mixed with the resin. For these reasons, it is better to mix the resin and catalyst well first, then mix in the fillers. The batch should then be thoroly mixed and all the lumps beaten out of the fillers.

2. Excess plastic should always be poured (about ¼" on large castings and ⅛" on the small ones) to allow for surfacing off the bubbles that will rise to the surface.

3. Castings should be allowed to set outside the oven for at least ½ hour before baking to allow air bubbles to rise to the surface.

4. Here are a few "Don'ts" that are the results of experience and experiment:

a. Don't lacquer a hot object.
b. Don't use aluminum lacquer to coat a mold.
c. Don't pour plastic into a mold when the lacquer is not dry.
d. Don't put a lacquered mold in the oven immediately after spraying.
e. Don't use shellac on molds.
f. Don't cast around metal inserts without immunizing.
g. Don't experiment with actual tools.
h. Don't mix the different types of lacquers or thinners.

I. BAKING.

1. Baking time depends upon the size of the casting. It also depends upon the type of mold used and the thickness of the material used in the making of the mold. The following table is to be used only as a guide and not as a strict rule. It is based on the actual baking time of the plastic and does not include the time necessary for the heat to penetrate the molds. The baking temperature is 175 F.

Castings	up to	1 gal.	 2	hours
Castings	1 to	2 gals.	 3	hours
Castings	2 to	4 gals.	..... 3½	hours
Castings	4 to	8 gals.	 4	hours
Castings	8 to	12 gals.	 6	hours
Castings	12 gals.	up	 8	hours

2. If a casting is soft and pliable when it is taken from the mold, it is still green. It should be hard and completely cured when it is taken from the oven. If a casting is pulled green and put back into the oven to cure, it is likely to get soft, pull out of shape and set in that position. **Be sure the casting is cured.**

It should be understood here that plastics are not a cure-all and that one

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THEIR SOLUTION

Addition of "Oildag" (colloidal graphite in oil) to regular greases.

THEIR RESULT

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(b) Current input 14% less

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"Oildag" is a registered trade mark of A. C. C.

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ACHESON COLLOIDS CORPORATION
PORT HURON, MICHIGAN

The electric furnace graphite in "dag" products is manufactured in the U. S. A.

EXCELSIOR No. 14 ANGLE ROLLING MACHINE

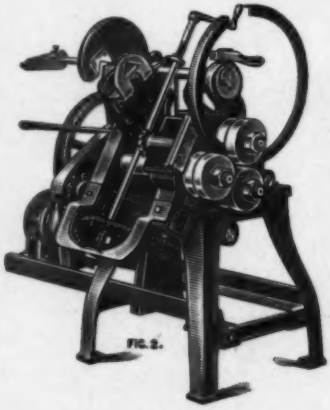

FIG. 2.

Capacity 2x2x¼" Angles. All the rolls are direct driven avoiding slipping of the material between rolls, which are operated by the oversize Excelsior friction clutch. Write for Price and Testimonials.

We specialize in Automatic Grinding and Polishing Machines, to polish Stainless Steel Sheets, Automobile Bumpers, and parts, Stove and Range Top Castings, Electric Iron Sole Plates, etc.

Also Inside Cutting Shears, Deep Throat Power Punches for duplicate work by the use of horse shoe templets up to No. 12 gauge. Used in Stove, Range, Air Conditioning and Kitchen Equipment Plants.

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East St. Louis, Illinois

plastic cannot do all the jobs. Plastics as a whole have their limitations. Much depends on the tool itself and the work it has to do. Much thought has been given by Lockheed and Vega, pioneers in the use of cast resinoids for extensive tooling, to all types of tools and even to those different tools within the types. Designs for proposed plastic tools have been scrutinized closely even before the orders were written. Personnel had to be trained, not only in the making of the tools themselves but also in determining their adaptability and the choice of the various compounds for the different applications.

The men who use the tools have been contacted and suggestions made as to their handling and usage. Plastic exponents at Lockheed and Vega have been gratified with the reception given plastic tools, which seems due partially to the psychological effect of their attractive appearance. The men want to take care of them. Consequently reworks due to breakage or misuse have been exceedingly small. The tools are popular also because of their light weight and ease of handling.

The research and development groups are continually investigating and testing better materials to do the same jobs, and new materials to do a different job. The outlook is very bright. The industry can look ahead to stronger and tougher plastic materials.

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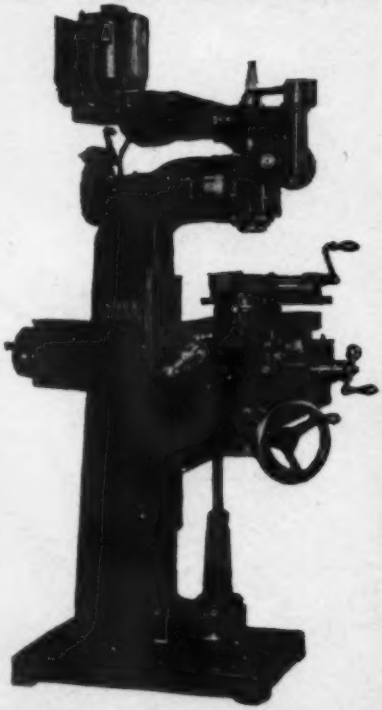
★ ★ INDEX MILLS ★ ★



Are attacking mountains of munitions parts with the ferocity of a mosquito boat after an enemy fleet. They are very versatile and are quickly adaptable to production work on the thousands of small precision parts now so vital to our Victory Program.

They do end mill work with end mills up to 5/8" in tool steel with amazing speed and accuracy.

Are equipped with verniers for locating holes and milled surfaces.

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2 TO 5 TIMES

TRY THIS NEW Grinding Wheel that "breathes!" Porous and "stringy" in texture, something like a sponge, Por-os-way's millions of air cells cool each grinding point between contacts.

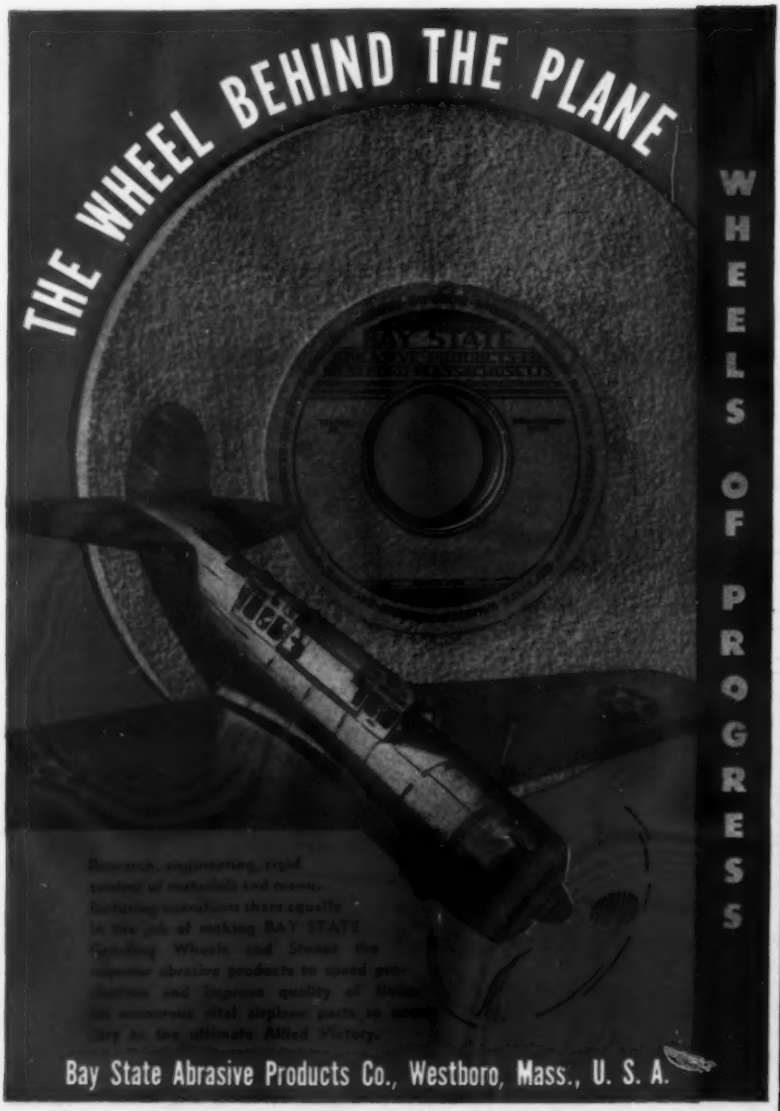
RESULT? Production speeded up 2 to 5 times! Each man, each machine, does the work of from two to five. You get deeper cuts—up to .010" or more—or your regular cut at faster speed.

FREE CUTTING. Por-os-way may be used on hardened tool and die steels. Also on softer materials such as aluminum, copper, tin, wood, rubber, and plastics for it resists loading.

3 YEARS' RESEARCH. The research which uncovered Por-os-way goes back three years. Timely as this wheel seems in today's situation, it is only coincidence that Por-os-way is offered now. You needn't fear that it's an "experiment".

"PRESCRIPTION-FITTED" Our experience has led us to offer Por-os-way only through specific prescription. It is never sold as a stock wheel. Sizes of air cells, grade and grain vary—and our engineers will determine the best for *your* job.

WE KNOW YOU'RE BUSY So we say: Just tear out and mail the corner of this page with your name, position, company and address. You'll receive a fully descriptive booklet—and a "prescription" blank for your use.


THE WHEEL BEHIND THE PLANE
WHEELS OF PROGRES
Bay State Abrasive Products Co., Westboro, Mass., U. S. A.

The Human Factors in Morale Building

Part V—Training Within Industry

By EDMUND MOTTERSHEAD

TRAINING, of course, is a broad field, but we are interested here in only one phase: **Job Instruction** . . . in other words, how to get **one** particular worker to do a particular job, **correctly, quickly,** and **conscientiously;** correctly because if it isn't done right it is a waste of time, money, material and tactical advantage in the battle . . . quickly because there is a war on and we want the goods today, not 6 weeks or 6 months from now . . . conscientiously so that the worker will take a personal interest in his job, in his company, and in his contribution to the war effort. Getting each worker to do his job in that way is the answer to war production.

First, let's see how the worker is being trained right now. Apart from letting him learn by himself instead of giving him definite instruction, there are basically two methods of instruction being used by most supervisors, foremen, and lead-men: — TELLING, and SHOWING.

Both of these methods have many advantages, and when used properly can obtain fairly good results, but both have their limitations, and a great deal of scrap and many headaches can occur from improper instruction by telling or showing.

There is the old story concerning the crew that was erecting a derrick on a construction job. The boss told the helper to slack off on a guy wire. What was really in his mind was to equalize the strain on all guys. The man, following instructions literally, loosened the shackle bolts completely and the whole strain of the mast was on a single guy . . . for a moment . . . the derrick fell . . .One example of the unfortunate results from mere **telling** as a method.

In the Job Instructor Training course

Improvement in the instructor's teaching technique is a primary aim of Training Within Industry.

Under careful supervision, the pupil follows the various steps shown and explained by the instructor.

of the TWI, (Training Within Industry) the fire underwriters knot is used as an illustrative example to bring out the weak points and strong points of instruction methods. Ninety-nine times out of 100, no matter how completely and carefully the trainer TELLS the learner how to tie the knot, the learner can't do it when the cord is placed in his hands.

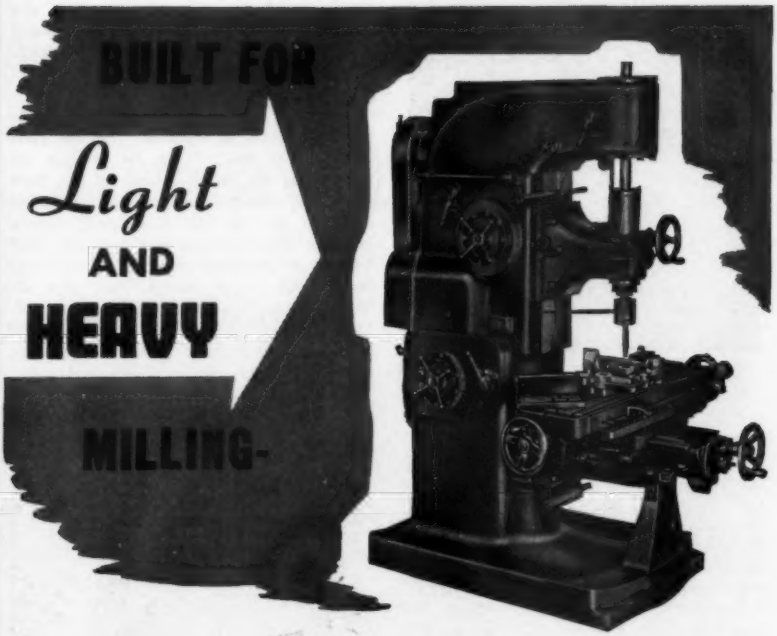
The knot, by the way, is the strain-taker-upper required by fire underwriters for all drop cord fixtures where the weight of the light is supported only by the wire. The knot rests in the bottom of the brass housing in the ceiling where the drop cord joins the wiring and takes up the strain. As an illustrative job, applying the training methods, it serves as a fine common denominator of all the things that can go wrong in job training . . . especially as most of the men in the classes don't know how to tie it anyway and are really trying to learn during the demonstration.

Showing, the other method, also fails to get in the learner to tie the knot . . . usually because he sees it backwards, or does not understand what is being done.

Did you ever have an experienced bundle wrapper **show** you how to tie a package and break off the heavy twine? It looked easy, but I'll bet you almost cut your hand trying to break off the twine the first couple of times. I saw an expert **showing** a helper how to solder on sheet metal. It certainly looked easy, but when the helper tried it, everything went wrong, the sheets warped, the solder wouldn't stick or ran where it wasn't wanted.

Why isn't just **telling a man** good instruction? In the first place, we are most of us predominantly eye-minded. Books, magazines, movies, street signs, traffic lights when we heed them . . . a great deal of what we do in life is determined by what we see . . . and telling doesn't help us see it. Secondly, there is the very human tendency to say too much too fast. Almost every time I explain how to tie the underwriter's knot by telling, the learner will say, "That's a lot of talk," or, "I think you passed me about 2 minutes

Mr. Mottershead (left) greets the pupil and puts him at ease—an important initial step in imparting instruction.



KNIGHT MILLERS, because of their many features, are well adapted for milling and boring operations. These millers incorporate versatility, rigidity, accuracy, speed and power. They are flexible, have a range of speeds and feeds for the efficient use of small tools and cutters as well as large. The swivel and tilting table eliminate the need for many special angle plates, angle cutters, and costly fixtures.

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Explaining the preliminary steps in tieing the Underwriters' knot, giving the pupil plenty of time to absorb each operation.

back." The human brain can absorb readily only about 4 seconds of just talk. Then it needs 10 or 15 seconds to soak it in and begin to understand it. The multiplicity of words is confusing. Then again, many words do not have specific meanings. "Curl," "shoulder," "ear," "cam," "bushing," and many other words have a hundred different applications and meanings. And then in many cases the technical words used on a particular job are common-place to the experienced worker but so much foreign language to the learner, something almost forgotten by the trainer.

Then let the pupil follow thru, supervising closely each motion. Any slips or mistakes should be corrected until the pupil has mastered the job.

Showing a man has certain definite weaknesses as a method. In the first place, it is difficult to be certain all the angles are seen. Much of the time a helper spends observing the skilled operator do the job is wasted, simply because the motions are too fast and he is not standing at the proper angle or position to see really what goes on. Many times this is carried to the extreme of seeing a thing backwards and doing it backwards. This is very often brought out in the knot demonstration. Then, in addition, most jobs have certain knacks, tricks or key points which

The most effective instruction is a proper combination of telling and showing, without too many words and with the action appropriately slowed.

make or break the performance of the job, but which are often difficult to show. And, finally, all too often a learner will simply **copy** motion without understanding **why** it is made in that particular fashion.

If there is enough **telling**, combined with sufficient careful **showing**, getting the learner in the proper **position** to observe correctly, you have the beginning of correct and efficient instruc-

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MOHICAN Atlas Steels, Ltd.	REX TMO Halcomb Steel Division Crucible Steel Co. of America
BETHLEHEM HM Bethlehem Steel Company	MOGUL Jessop Steel Company
MO-CUT Besshurn Alloy Steel Corp.	TATMO Latrobe Electric Steel Co.
STAR MAX Carpenter Steel Co.	S.T.M. Simonds Saw and Steel Co.
MOLITE 8 Columbia Tool Steel Company	MO-TUNG Universal-Cyclops Steel Corp.
REX TMO Crucible Steel Co. of America	VUL-MO Vulcan Crucible Steel Co.

2301

tion, but that is not the whole story.

Suppose you are about to instruct a man how to do a particular job. Perhaps he is a new man; possibly he has been transferred to you; perhaps he has been under your direction for years and is about to start a new, higher skilled operation. Can you remember how you felt on your first day on a new job? Can you remember the times you were unable to get the hang of it, the times you produced scrap, the times you got hurt thru carelessness or ignorance; the times when somebody coached you and helped you along? The worker you are about to instruct, feels the same way. He wants to make good. For your part, you are accomplishing 4 things:

1. Having him come up to the quality and quantity of production as quickly as possible.

2. Avoiding accidents which might injure the worker.

3. Avoiding damage to the machines.

Example 2.

JOB BREAK-DOWN SHEET FOR TRAINING MAN ON NEW JOB

Part: Shaft. Operation: In-feed Grind on Centerless Grinder.

Important Steps in the Operation	"Key Points"—knacks, hazards, "feel," timing, special information.
1. Place piece on plate against regulating wheel.	"Kneel"—don't crank on wheel.
2. Lower lever—feed.	Hold at end of stroke (count 1-2-3-4). Slow feed—allows stock input. Watch—on rough grinding
3. Raise lever—release.	
4. Gauge piece periodically.	More often on approach tolerance.
5. Readjust regulating wheel as required.	Watch—on back feed.
6. Repeat above until finished.	
7. Check.	

A lead man on a machine shop did this break-down in 5 minutes.
This lead man uses this break-down "as is" for men who have had previous experience on centerless grinders. For green men he breaks up the operation into several "instructing units." He strikes off a detailed breakdown for each unit.

A typical job break-down sheet on an 8x10½" page. The operations list the steps in infeed grinder on a centerless grinder.

Example 1.

JOB BREAK-DOWN SHEET FOR TRAINING MAN ON NEW JOB

Part: M-1 Circle Aiming Lens. Operation: Rough Grind Radius 1.

Important Steps in the Operation	"Key Points"—knacks, hazards, "feel," timing, special information.
1. Select grinding spheres and radius gauge.	
2. Place sphere in spindle.	
3. Try out machine.	
4. Grind.	Rotate while grinding. Pause until it "pulls"—"feel." Measure by count.
5. Check radius and thickness.	Clean gauge—no sand! Clean lens.
6. Repeat till proper radius is obtained.	Work surfaces from outside to center. Concave lens "flutters." Convex lens "slurps."
7. Check job.	

A foreman in a precision lens grinding shop made this break-down in 7 minutes.

This job break-down lists the different operations on a circle aiming lens, rough grinding radius 1.

4. Avoiding scrap as much as possible.

Most of us jump in with both feet and **start** without any particular thought or planning. We know the job so well by now we've forgotten the things that stump the learner. We feel so familiar with the job that we don't plan how to put it over. The key points, the knacks, are so commonplace we overlook them entirely. Before we even consider HOW to instruct the worker, there are some things we must do to GET READY.

These are the four things you should take care of before instructing:

1. Make a timetable. How much skill do you want the man to have . . . by what date?

2. Break down the job. Outline on paper for your own memorandum the basic steps and the little knacks . . . key points in the job.

3. Have everything ready . . . the right tools and materials.

4. Have the workplace properly ar-

Easily Adapted to Involute . . . and NON-INVOLUTE *Small Gears*

The "Straight-Line" Cutter may have either a continuous series of teeth or be of the gap-type as shown. In the latter case each group of teeth cuts a complete gear or pinion.

The Fellows Straight-Line Gear Generator employs a rack-type cutter which as easily can be ground in non-involute form as to involute profile. This is of especial interest to makers of

Watches	**Projectors**
Clocks	**Indicators**
Meters	**Range Finders**
Cameras	**Shell Fuses**

Instruments

High-accuracy parts, made to Fellows precision standards, can now be produced at rates which compare with or exceed sub-press output. For details, write for the Straight-Line Gear Generator Bulletin.

THE **FELLOWS** GEAR SHAPER COMPANY

River St. Springfield, Vermont—640 West Town Office Building, Chicago, Illinois—616 Fisher Building, Detroit, Mich.

ranged, just as he is to keep it.

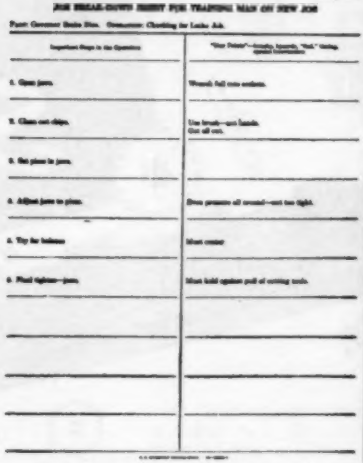
Time is precious these days. Don't just stall and say to your self:—"He just has to learn," or, "It takes so much time . . . " Decide what quality and how much he should produce, and set a definite date in your book for him to reach that standard.

Have the tools and materials ready. Don't fumble around. Don't use the wrong tools. Don't find it necessary to borrow tools from the next bench to show him how to do the job.

See that the workplace is properly arranged, including all the details that go into shop housekeeping. If the worker is introduced to a sloppy situation, there's a temptation for him to keep it that way. Starting things off right at least gives you an even break that he will keep it as he found it.

Breaking down the job . . . is not the complicated process of the methods or time-study man. It is simply an orderly listing of the steps and key points or other special information that you want him to learn. The headings of the form for job breakdown used by the Job Instructor Training course conducted by the Training Within Industry Division of the War Production Board are shown. Following it are several sample job break-downs made by foremen in various shops and used by them in breaking their men in on the jobs.

One of the most frequent single reasons for faulty job instruction is the simple fact that the trainer has not organized the steps and key points in his mind. It takes only a few minutes to make a break-down of the average job . . . not a sheet of instructions for the worker, but a practical outline to guide the trainer. One thing will make these break downs easy . . . a step you DO, a key point you KNOW. Even if a supervisor has many different jobs to handle, a wide variety of breaking-in and instruction situations, one or two



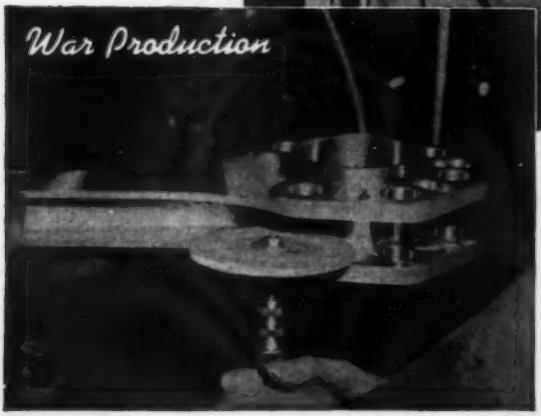
Break-down of the different operations chucking for a lathe job. The part is a governor brake disc.

such simple job break-downs made every day for a month will result in an exceptionally valuable file of workable information.

The importance of these breakdowns cannot be overemphasized, as they mean **complete coverage** in the instruction of all essential steps and key points. There is the story that comes from a New Jersey concern engaged in the making of airplane engines. It seems that a young man got a job in the plant, his particular duty being to buff the rocker arms. At the end of his first day on the job he went home, and his father, an experienced machinist, asked him what he was doing. His son told him, and the old man said, "Well, just what do you do?" The boy replied, "Oh, I sit in front of a couple of little grinders and buff it on the ends on one side and then on the ends on the other side and then put it in a basket and reach for another." "How many do you have to turn out?" The lead man said 400 a day but I got out

Jarvis POWER TOOLS

Sanding and finishing ornamental bronze. Photo courtesy of General Bronze Corp, New York



Finishing aircraft engine master rod. Photo courtesy of Wright Airo. Corp.

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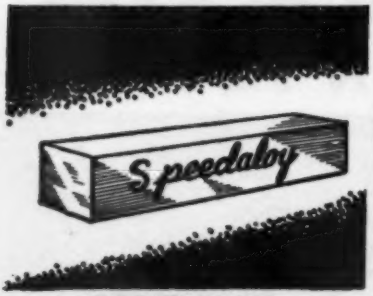
WITH
SPEEDALOY
TOOL BITS AND TIPPED TOOLS



SPEEDALOY

- **SPEEDS UP PRODUCTION 50 to 150%**
- **SPEEDS UP CUTTING OPERATIONS**
- **SPEEDS UP COST SAVINGS**
- **SPEEDS AWAY TIME LOSSES**

WHAT IT IS

SPEEDALOY is a cast, cutting material made up of a special tungsten chromium alloy. It fills the breach between high speed steels and tungsten carbides in both performance and price.

WHAT IT DOES

SPEEDALOY wears longer than high speed steel and resists shock more than tungsten carbides. It will machine all materials except manganese steel and chilled iron. It should be run faster with about the same depth of cut and feed as high speed steel — thus increasing production 25 to 75%.

SPEEDALOY has proven exceptionally effective on stainless and other nickel or chrome alloy steels.

SPEEDALOY can be supplied in tool bits, flats, and a wide variety of tipped tools available for immediate delivery.

Literature on request.

CIRCLE TIP TOOL CO.
EAST ORANGE NEW JERSEY

125 today which isn't so bad for a start."

So a couple of weeks went by, and one evening the boy's father asked him how he was getting along, and the boy replied, "Had a swell day. Turned in 225!" His father didn't say anything further about it and a couple more weeks slipped by. So he asked his son again. And the boy said, "I'm really getting there now. Got out 375 today, and only had 60 rejects."

Well, the old man began to wonder if there wasn't something wrong with the boy or the job or what. So the next night he inquired again, and was told;—"Say, there's nothing to it. I got out 600 today, all perfect!"

"What? How come? Yesterday you had 375 and all that scrap."

"You know that buffer . . . it has two grinders on it, one coarse and the other fine. I've been working them all down on the fine grinder all this time, and it was just this morning that one of the other guys told me I should touch 'em up a bit on the coarse wheel and then use the fine one."

Haste . . . oversight . . . wasted time and effort . . . resulting probably from a lack of even the simplest job breakdown. Get that breakdown for complete coverage!

So now you have prepared **yourself** to instruct the learner. You have your time table, the job broken down into its steps and key points, all tools and materials ready and the workplace properly arranged. Here comes the worker walking down the aisle looking for his new boss. And you are going to instruct him the **Right Way**, according to the TWI formula the various steps of which are interpolated in smaller type between paragraphs of this imaginary conversation. (THE TIME: 10:30 a.m. THE PLACE: Amalgamated Electrical Appliance Corp.)

Here Is What Happens:

STEP ONE: **PREPARE** the worker to receive the instruction.

"PUT IT ON THE BLANCHARD"

Cast Iron, 30½" x 13" x 1"
Stock per side 1/16"
Limits — must be parallel
Number of Sides 2
2 pieces (4 surfaces) per hr.

Here **THE EASIEST WAY IS ALSO THE BEST**

This is a difficult job to do any way but on a Blanchard. The piece is of thin section and apt to spring if it is locked in a fixture strongly enough to hold it. The piece is shimmed the first time and a clean-up cut is taken. It is then turned over and a light cut taken on the other side. This operation is repeated four or five times before it is finished.

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MACHINE COMPANY
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ATTACHMENT
Liberty High Speed Grinding Attachment eliminates needless time wasted in set up on surface grinders, as it takes but a few minutes to attach.
LIBERTY TOOL & GAGE
236 GEORGIA AVE. WORKS PROVIDENCE, R. I.

Foreman Jones: Hello. Are you looking for me?

Worker: I guess so. Are you the foreman here?

Jones: Yes. My name is Jones, Tom Jones, what's yours?

A. Put him **at ease.** The learner can't think straight if you make him self-conscious or frighten him.

Worker: I'm Jack Oliver. The personnel office sent me down here with this card and said you wanted a man for assembly work.

Jones: That's right. (Takes card.) So your name is Oliver? I suppose they call you Jack? (Nod.) That suit you? You call me Tom, everybody does. Besides, there's lots of Jones' alive, but I'm the only Tom in the department here.

Oliver: O.K., Tom.

B. Find out **what he** already **knows** about the job.

Jones: (Looks at card.) So you just got out of Lane Tech? Did you learn all about wiring and electrical devices there?

Oliver: Well, I took the technical course, but there ought to be a number of things I'll have to learn yet.

Jones: That's all right. I've been here for some years now, and there are still about that same number of things for me to learn too. We have a joo here that ought to be of some interest to you. Did you ever do any hunting, any camping out?

. . . specifically . . . in detail . . .

Oliver: Sure. We go up into Canada almost every summer, spend a month or so in the wild part.

Jones: That sounds like a lot of fun. Did you ever have any use for a flashlight on any of those trips?

Oliver: Plenty! We used them for everything from trailing to signalling.

C. Get him **interested.** Relate his job to the final product. Show the use and value of that product, etc.

Jones: Well, the job we have for you here as a starter is that of assembling a special type of belt-hung flashlight that is part of the standard equip-

MODERN - MAGIC
QUICK CHANGE CHUCK AND COLLET EQUIPMENT

Has reduced the idle time of revolving spindles to practically zero. With this chuck in revolving spindle machines, tools can be changed while the machine is running without stopping or even slowing down the spindle.

MODERN TOOL WORKS
Division of Consolidated Machine Tool Corporation
ROCHESTER, NEW YORK

ment for our new tank divisions. You have had enough experience to understand the importance of having a flashlight in perfect working order. And you can see the usefulness of it to the boys who are rolling those heavy tanks around.

Oliver: I sure can!

D. Put him in the right **position.** Don't have him observe backwards or from any other angle than that from which he will see the job when he works.

• Three grades of diamonds. Common quality $12 per karat. Medium quality $24 per karat. Select quality $48 per karat. (Contour template diamonds supplied only in Medium and Select quality.)

All diamond sizes ¼ to 10 karat are nib mounted for immediate shipment . . . Billed subject to approval. Specify quality of diamond wanted. We recommend a minimum size of one karat for each 6" diameter of grinding wheel. (24 hour resetting service. $1.00 post paid.)

Grinders instruction card free.

DIAMOND TOOL COMPANY, Not Inc.
Sheldon M. Booth, Pres.
935 E. 41st Street CHICAGO, ILL.

Jones: Well, you'll find this is a very simple job. It is no more complicated than putting together any other flashlight, and you should have no difficulty with it. But, this is a war order, and we have to get out production fast. So we have developed a definite method of putting these parts together to accomplish it **correctly** and yet as **quickly** as possible. I'm going to show you that special method, and you'll find as you use it that you can turn out more work and be less tired at night than by following any other method.

Oliver: I understand.

Jones: By the way, are you right handed or left handed?

Oliver: Right Handed.

Jones: Fine. Now if you'll just stand over here where you can see what goes on, I'll explain this operation to you. (Moves worker to proper position.)

STEP TWO: **PRESENT** the operation

A. First time thru, tell, show, illustrate, explain; bring out **Key points.**

Put it over in small doses . . . 4 **Seconds** at a time . . . go slowly—aim for accuracy now, speed later.

Jones: (Picks up completed light.) Here is the completed flashlight. You can see that the lens is specially ground; extra fine work. The housing for the lens and reflector are made so as to give out a very strong and narrow beam of light. These clips on the back of the square case are for hanging it to your belt. And you can

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SAVE MOTORS by keeping them clean with the TORNADO Portable Electric Blower. Blows out dust, dirt and lint. Operates from any light socket. No dangerous condensed moisture.

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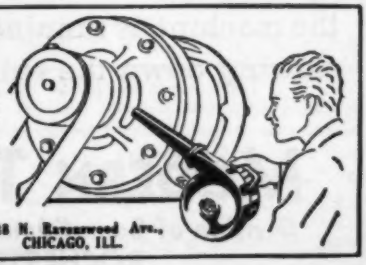

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Save TIME TAPS TROUBLE with the New VIKING TAPPER

You save time because the Viking Tapper eliminates the wasting of valuable time by highly paid skilled men trying to tap holes accurately by hand. One fifth the time is required.

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For Precision Tool Room Tapping use the Viking Tapper. Capacity ¼" to ⅝".

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THE VIKING TOOL & MACHINE CORP.

14 MAIN ST., BELLEVILLE, N. J.

see that the square flat bottom makes it easy to set it down and throw light directly where you want it for night repairs or anything of that sort. Now let's take this one apart so we can see what makes it work. First get the names of the parts straight so we both will know what we are talking about. (Starts to take it apart and names each piece as he does so, making sure Oliver understands each. Then makes a check on that.)

B. Repeat and Question, either on each step as you go thru it, or at the end as a final check-up.

Jones: Now just to make sure you've got all that, what do we call all these pieces?

Oliver: Well, there's the cap, and the back, and the case, and the bottom, and the batteries, and the switch, and the lens, the lens housing, the reflector, the reflector spring, and bulb.

Jones: Fine, I think you have that down well. Now the case will come to you subassembled like this, with the bulb already inserted. The bulbs have been tested and should work when you have it all put together. In front of you on the bench here, you have these chutes which come down from those part-bins overhead. The stock boy will keep them filled up for you, and if you begin to run low on anything you can tell him and he'll bring them to you. You see here in front of each chute a little pile of parts. All you have to do is to pull those parts toward you and more will roll down the chute, so you always have plenty easily within reach. Now the first thing you do is pick up the case in your right hand and grab two batteries with your left. You can

Step One: Insert batteries.
Key point: Left Thumb.

see on the inside of the case this diagram which shows which way to put the batteries in. However, for speed, you can't be bothered looking each time; so when you pick up the 2 batteries, hold them by the ends, the one on top facing one way, and the other

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facing the opposite. And place the one on top so that your left thumb touches the contact point. That way they will both automatically be in correct position and you can shove them in place fast without any bother.

Step two: Put on back.
Key point: Lugs Span shut.

Next, pick up a back with your left hand, stick the little lugs into the slots on the case, and snap shut with your right thumb.

Step Three: Inspect.

Now try your switch to test the light. All batteries, contacts, and bulbs have already been inspected, but just try the switch. That way if it doesn't work you haven't wasted a complete assembly operation before finding it is defective. If it doesn't work, put the whole thing, batteries, case and light into that bin. We haven't time to hunt for the trouble now. I'll tell you about that later.

Step four: Put on cap.
Key point: Firmly.

Next pick up a cap in your left hand and put that on firmly. Then shift the whole thing to your left hand so that the bulb faces to the right. Then with your right hand pull a lens housing, a lens, a reflector, and a spring toward you.

Step Five: Put on lens assembly.

Put the housing on the bench face down, put the lens into it face down, put in the reflector face down, and put the spring on top of it.

Key point: piling up—1st and 2nd fingers—
KP: Backthreading.

Hold that spring thus with your first and second fingers, guiding it over the bulb and screw the housing on. When you screw on the housing, backthread it a little, see, like this, to be sure the threads and the housing is seated properly. Then turn it up firmly. Check the switch once more for luck and put the completed light in this box. Now, do you have any questions?

B. Repeat and question.

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Complete fittings for one, two, three, four and six spindle units carried in stock. Special set-ups built to order.

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DIAMOND TOOLS
Multi-Point, Multi-Set, Multi-Edge, and Single Set. Diamonds for All Industrial Purposes.

Jones: Well, to be sure we have everything under control, we'll go thru it again. What's the first thing we do?

Oliver: Pick up the case in your right hand and 2 batteries in your left, one pointed each way, with your left thumb on the contact point of the one on top.

Jones: Right, and then what?

(So Jones will continue to ask a number of questions, **How, What, When, Where, Why, Which,** questions that cannot be answered with "yes or no"—which require a definite fact or explanation. If he can answer, he has learned, if not, explain it again.)

STEP THREE: HAVE HIM **PERFORM** the operation.

Jones: I think you have an understanding of how this job is to be done. Now let's see you try a couple. Move over here to the bench and be comfortable.

A. Correct any errors. Repeat until operations are done perfectly.

(Oliver takes over and assembles a light. Jones watches, says nothing so as not to bother him or make him nervous, but ready to step in and correct any errors almost before they are made. This continues until Oliver does one perfectly.)

B. Repeat and have the worker **explain back** what he is doing.

Jones: That's fine. Now you know, Jack, it is fairly easy for somebody like yourself with a natural mechanical skill to observe motions and pick up the knack of things. But just to be sure that you fully understand all of this as well as remembering how to do it, I'd like you to make one more and as you do it, explain each step and show me the key points.

(Oliver assembles and explains.)

Continues until the trainer is SURE the worker knows.

Jones: You know, Jack, I think you're gong to handle this job just fine. For the next couple of days you will be on flat hourly rate, so take your time, get every one right, and gradually build up your speed on those

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key motions. Then we'll put you on a piece rate and you'll have a chance to make some pretty good money. And of course, keep in mind that this work leads to many other things. Now I'm going to leave you here, and you go right ahead turning them out.

STEP FOUR: PUT HIM ON HIS OWN.

A. Check frequently at first, gradually less and less until just normal supervision.

B. Tell him definitely whom to go to if he needs help. Encourage him to ask questions.

C. Introduce him to one or two of the boys to make him feel more at home.

D. Take care of any details such as cafeteria, hospital room, locker, etc.

E. Leave him with a final pat on the back for encouragement.

I'll be back in a little while to see how you are getting along and answer any questions you may have. And remember, anytime you have any questions, don't be afraid to ask. Don't ever think a question is "too dumb." Most of these other fellows are on a piece rate basis too, and, being pretty busy, would rather not be bothered. I have plenty of time for that sort of thing tho, and I'll be glad to answer them. Now, I'd like you to meet one of the other fellows here. (Calls over Jim Smith . . .)

Jones: Jim, I'd like you to meet Jack Oliver. He is going to start out on this army flashlight assembly here. He says he's done quite a bit of camping and traveling, maybe you can make him believe that fish story you came back with last fall. And Jack, any questions you may have, if I'm not around, you ask Jim here.

Oliver: I'm sure glad to meet you, Jim. I'll try not to bother you too much.

Jones: OK. I think you have a good understanding of this job, and won't have any trouble handling it. See you later.

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lems indicates that usually it cuts the training time in half . . . and avoids much scrap and rework. The Training Within Industry course has a slogan: **"If the Worker Hasn't Learned, the Trainer Hasn't Trained."** Use this plan. Use it, or whatever part of it applies every time you want to put over a new idea, a new skill, a new operation to a worker, either an experienced man or a new employee. Use it when you check a man's work and make suggestions for his improvement. Use it at every opportunity, and remember that there is nothing in it of idle theory. Every step and principle has been tested in practice for over 25 years by some of the leading plants in this country. You will be amazed at the greatly improved results that will come from the consistent application of such a simple plan.

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For information or advisory assistance concerning the training of workers while on the job, apply to the Training Within Industry district office nearest you.

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Atlanta, Ga., Georgia School of Technology, 225 North Ave., NW. (Hemlock 6890)

Baltimore, Md., Room 3106, Baltimore Trust Bldg. (Plaza 7460)

Boston, Mass., Room 1033, Park Square Bldg. (Hubbard 0380)

Chicago, Ill., Rm. 2600, Civic Opera Bldg., 20 No. Wacker Drive (Andover 3600)

Cincinnati, Ohio, Room 840, Union Trust Bldg. (Cherry 3740)

Cleveland, Ohio, 4th Floor, Union Commerce Bldg., Chester—9th St. (Cherry 5975)

Denver, Colo., Room 518, U. S. National Bank Bldg., 817 Seventeenth St. (Main 4231)

Detroit, Mich., 8th Floor, Boulevard Bldg., 7310 Woodward Ave. (Trinity 1-5500)

Houston, Tex., Room 3201, Gulf Bldg., (Capital 7201)

Indianapolis, Ind., Room 1428, Circle Tower Bldg. (Market 9411)

Los Angeles, Calif., Room 452, Roosevelt Bldg., 727 West Seventh St. (Trinity 2104, 2105)

Minneapolis, Minn., 326 Midland Bank Bldg. (Bridgeport 7591)

Newark, N. J., Room 601, 605 Broad St. (Mitchell 2-1114)

New Haven, Conn., Room 513, 152 Temple St. (6-5186)

New York, N. Y., Room 2026, 11 West Forty-second St. (Murray Hill 3-6805)

Philadelphia, Pa., Room 2301, 12 South Twelfth St. (Locust 3400)

Pittsburgh, Pa., Room 360, Administration Bldg., Carnegie Institute of Technology (Mayflower 2600)

Portland, Oreg., Room 1006, Bedell Bldg. (Broadway 0380)

Raleigh, N. C., Raleigh Bldg., Fayetteville and Hargett Sts. (2-3306)

St. Louis, Mo., Room 603, Shell Bldg. (Central 4206)

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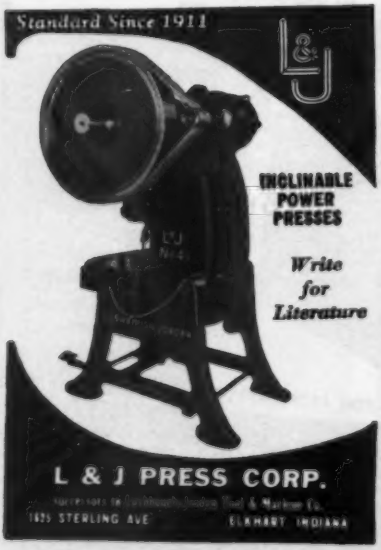

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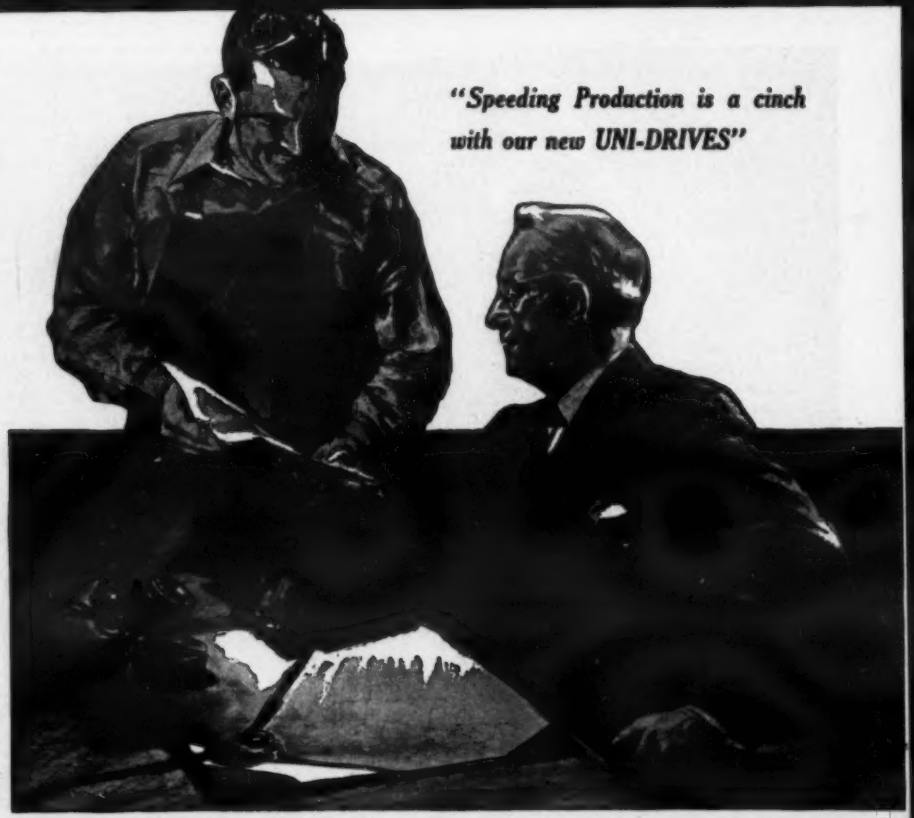

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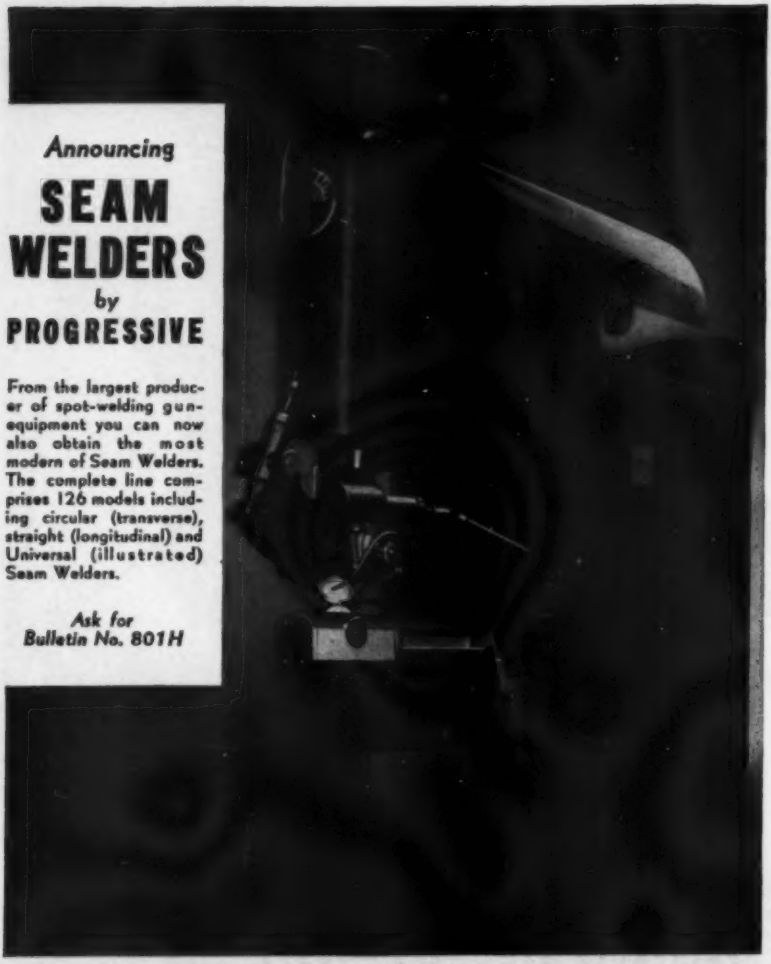

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A prominent machinery manufacturer (name on request) now sharpens single flute countersinks in one-fifth the time formerly required. This is typical of savings in time made possible with the Gorton 265-5 Grinder.

Special angle countersinks formerly sharpened in 45 to 50 minutes are now completed in only 8 to 10 minutes on a Gorton 265-5 Grinder.

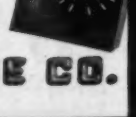
The grinder is mounted beside a Gorton 3-U Engraver, and in-between-job time of the operator is profitably consumed in sharpening drills and special countersinks for various shop departments, as well as the engraving tools.

It is also used for sharpening carboloy tipped drills for drilling cast iron and many other small jobs where fine accuracy and fast production is desired.

This Grinder is an accurate, inexpensive tool for fast, precision grinding of single flute cutters. It is also used for grinding extremely sharp pointed punches. Interchangeable tool heads are available for a wide range of work.

COUNTERSINK GRINDING DATA

MACHINE—Gorton Cutter Grinder 265-5.
PART—Special Countersink.
MATERIAL—High-Speed Steel.
GRINDING WHEEL—4" Dia. with 1¼" Hole.
OPERATION—Grind Point.
HOLDING—Collet Type Tool Head.
GRINDING TIME—8 to 10 Min.



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Burring Machine Parts

By M. C. PECSOK

HOW long does it take to "burr" machine parts?

If it takes you nearly as long as most manufacturers were found by brushing analysts to be taking, it is much too long!

In a study by Osborn brush engineers the country over, it was found that while "burring" is important in the manufacture of all machinery, it is vital in the case of war production industries.

Most metal mechanical parts are sawed, routed, milled or cast. "Burrs" accumulate on these parts. To prevent friction, scratching and cutting into the part or the machinery into which the part fits, these "burrs" must be removed.

Our brush engineers found, after making careful surveys from coast to coast, that numerous industrial firms are taking anywhere from one-half to 10 times longer than necessary for most burring operations, simply because the wrong types of tools are being employed—or because certain operations are being attempted by hand, which can be handled more efficiently by some form of power-brush application.

The results of the changeover in method, in the case of the firms that tried recommendations of the analysts, were nothing short of amazing to the layman, but only verified a condition which executives of our company knew to exist in many industrial plants.

Fig. 1—This wire wheel brush speeds the cleaning of weld scale, "burrs" and other dangerous residue. Operations such as this are vitally important in every factory or industry.

Fig. 2. — This workman, typical of thousands thruout the country, is removing "burrs" from a casting by means of a power-driven wire wheel brush.

Increases of 50% to 1000% in speed of "burring" or otherwise cleaning, polishing or preparing metal for war production, are not uncommon in America's war industries that have gone in for "brush engineering."

In fact, dozens of examples are "on record" and can be cited where almost unbelievable stepped-up production was obtained—simply by application of the proper type of power brush.

Castellated nuts are small, but vital, parts in the manufacture of aircraft engines. Unless thoroly cleaned with the right type of brush, they are loaded with "burrs," the edges of which have knife-like sharpness. The condition must be remedied, for these nuts are attached to moving parts of the engines. Should the "burrs" or other foreign material loosen and get into the oil, they could cause untold damage. Also, unless the sharp corners are broken and rounded, there is a possibility of their scratching highly polished precision machine parts during assembly, which would impair the engine's efficiency.

Armament manufacturers must carefully clean movable parts of destructive "burrs," welding slag, etc. by industrial brushes. Loosened "burrs" could clog a firing pin on a shell so that the shell would fail to fire; they could so damage the precision mechanism of a large gun that it would fire inaccurately.

While several methods for removing "burrs" have been employed, power-brush analysts have found that the right kind of power brush in many cases can do it best, most quickly and most economically.

Industrial power-driven brushes are used extensively in the removing of scale. Armor and other plates of a modern battleship are brushed from stem to stern and from port to starboard, both inside and out, to remove scale that is left after decarburizing. Every bit of welding in a battleship has to be brushed to remove welding scale. Brushes are also used extensively in the tempering of sheets and plates. A typical application in removing welding scale is seen in Fig. 1.

In spot welding of aluminum alloy parts, highly important in the aircraft industries, the scale must be removed prior to the spot welding to assure a perfect weld. Stainless steel wire brushes have been found to prepare the surface better than any method yet devised, and are far less expensive than other methods.

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Fig. 3—Here is a treated "Tampico" section, another special brush produced by Osborn, being given a break-down test by technician Edward Vennewitz.

At the eastern plant of a large corporation engaged in war production it was found by brushing analysis engineers that a dual operation of removing "burrs" and polishing aluminum parts was being handled very slowly. Osborn engineers recommended that a 12" diameter "master-wheel" brush of .0118" gauge wire, be substituted for the brush that was being used. The same variable power machine formerly employed was used at an increased speed of 2750 rpm. At least 20 minutes' time is now saved when the brushes are changed, because the master wheel is a unit type, properly-balanced adapter wheel, while in the old method the brush sections had to be mounted in a special hub by the operator. The former brushes were not balanced and did not operate smoothly.

At the plant of a large airplane manufacturer, Osborn engineers found that "burrs" were being removed from steel tubing by hand. It was recommended that polishing jacks be used, together with a special disc-center sectional brush of 8" diameter and .014" gauge wire. The new brushing operation was tested at 3000 rpm and it was found that an excellent job of "burring" was done, which speeded up the operation, as formerly handled, at least 100%!

Typical of the operation of removing "burrs" from tubing and castings is Fig. 2. The workman pictured here, typical of thousands thruout the country, is removing burrs by means of a power-driven wire wheel brush produced by Osborn. The convenient arrangement shown, with the brush driven thru a flexible cable, helps speed up the operation vitally.

An Osborn development which has great significance in war production is the new "Tampico" fibre industrial

Fig. 4—This tiny brush, held by Osborn technician Mark L. Wright, gives some idea of how small an industrial brush may be. It is also used in special "burring" operations.

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HERE ARE 5 OF MANY USES FOR THIS ELECTRIC FURNACE

1 **HARDENING SMALL MACHINE PARTS** — Do your own heat treating—avoid delays of relying upon overcrowded commercial heat treaters.

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This small compact electric furnace is ideal for small tool and die shops lacking heat-treating facilities. It prevents delays of heat treating due to over-crowded conditions in commercial heat-treating plants. It is compact, inexpensive, handy and easy to operate. Small parts can be handled without heat and power waste of a large furnace. Pre-heating of small high-speed tools can be handled quickly and easily. Repair parts on emergency orders can be rushed to completion in your own plant—no need to send them out for heat treating.

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Type	*Chamber Capacity*	*Amps 115 V*	*Watts*	*Amps 230 V*	*Price*
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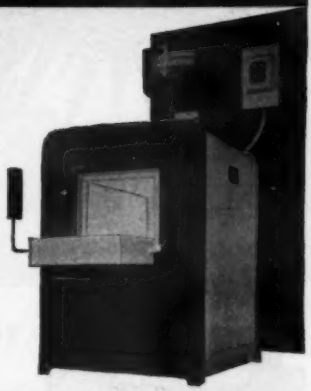
**Includes Cast Nickel Chromium Hearth Plate*

MAX. SAFE TEMPERATURE—Continuous operation, 1750° F.; Intermittent operation, 1850° F.

AUTOMATIC CONTROL—Indicating Controlling Pyrometer—Thermo-couple and lead wire complete—$142.40.



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ON THE NEW ATLAS DIE-FILING MACHINES

Can be used for all kinds of die making. The overarm is constructed so that the file and saw attachments may be interchanged with little effort. The holddown fingers are attached directly to the overarm. Working surface of the table, which tilts two directions, is entirely clear. An improved type chuck, consisting of movable hardened jaws, holds both saws and files. Screw adjustment makes changes easy and fast.

Price, complete with motor— $125.00 Net

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ATLAS EQUIPMENT CO.

103 S. Clinton St., Chicago, Ill

brush, which is treated by a secret process. One of the important features of this new development is that it can be used on "burring" operations on light aluminum sheets without the use of abrasives. If, however, the new "Tampico" brush, (Fig. 3), is used with proper abrasives, it will remove tool marks from aircraft motor parts, such as connecting rods, tappets and cams. This brush has also been recommended by brush engineers for breaking corners and many other uses on precision machine parts.

Another "burring" operation, applicable to many industries, is the removal of razor-like residue from stainless steel sheets. It was discovered that in the metal branch department of a large aircraft manufacturer, "burrs" were being removed from stainless steel sheets by other methods. A special stainless steel wire, unit-wheel type brush, 10" in diameter with .018" gauge stainless steel wire was recommended to be operated at 3600 rpm.

This operation was formerly very slow and tedious, for the operator had to use extreme care in doing the work. With the new brush, the operation was speeded up 50%, and no carbon marks were left as would result had a regular wire brush been used.

De-"burring" brushes are manufactured in many sizes and types. Figs. 1 and 3 show two of the larger type brushes serving this need, but certain "burr"-removing brushes are of tiny size. The one shown in Fig. 4, held by Osborn technician Mark L. Wright, is typical of this type. But it isn't the smallest industrial brush manufactured by Osborn—if it were, it wouldn't show in the photograph. This tiny wire wheel, in addition to being used for removing "burrs," is ideal for cleaning inside of tubes, or for polishing grooves in castings and other products of industry.

(Illustrations—Courtesy Brush Division, The Osborn Mfg. Co., Cleveland, O.)

This File-Cut Bur Bites Best

Hard-skinned unmachined cast iron just won't yield to burs designed for use on softer stuff; it sets them bouncing, wears them down, leaves a ragged cut.

To strip through that tough overcoat, use Pratt & Whitney's HSS File Cut Burs (sometimes called hand cut burs or rotary files) with right-hand spiral cuts. Take off the surface shell with a *coarse* cut bur, then switch to *medium* or *fine* cut for the finish. And treat a file cut bur like a hand file — break it in at slow speeds and work up gradually.

Result: *clean, accurate cuts in the work . . . full service from burs.*

For detailed solutions of your individual burring problems, write our engineers. Their long experience in design, manufacture, and use of Kellerflex Flexible Shaft Machines and equipment can help you to save materials and speed your share of American war production. Address Kellerflex Sales Department.

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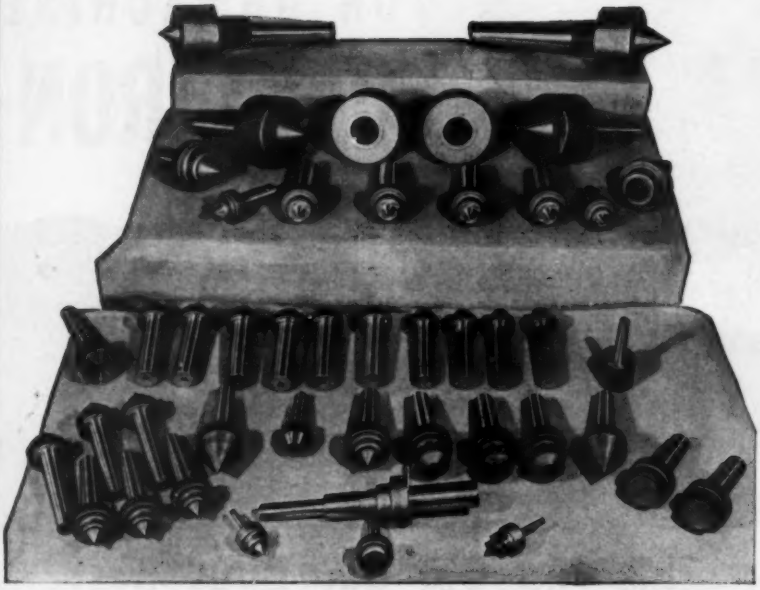

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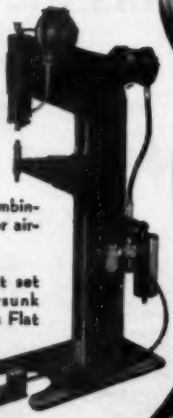
Tomkins-Johnson Air Powered RIVITOR



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By using a different type of rivet set and jaw construction, Countersunk Head Rivets are handled as well as Flat Head, Round Head, Full and Semi-Brazier Head Rivets. For specifications, etc, write Dept. H.

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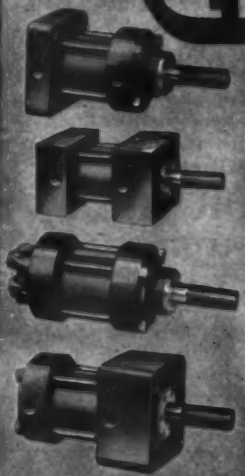

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T-J Air Cylinders

These units exert power movement from 100 lbs. to 12,000 lbs. (direct). Made in styles, sizes and strokes to meet your requirements.

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Designed and furnished in types and sizes to exert power movement from 1,000 lbs. to 50,000 lbs. (direct).

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THE TOMKINS-JOHNSON CO.

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Thread Grinding with Electrical Control

By LEE M. DAVIS

THE first thread grinding was probably done with an engine lathe on a piece distorted from hardening and necessitating a more accurate job. This, of course, was not production thread grinding but merely a correcting process using a small wheel without coolant and any accurate means of truing the wheel to the proper thread form.

Since then many important things have happened to thread grinding. In 1920, the first hardened and ground taps were made for commercial use. These taps, of course, made better and more accurate tapped holes than had been possible before. It was not until 1935 that a thread grinder was developed for grinding the present variety of work and the present modern machines are made very heavy and rugged, weighing about 4 tons. This seems like a lot of machine just to control the point of a wheel, but this weight is necessary to prevent vibration which will break down the wheel so it can not remove the stock that is necessary to grind a thread.

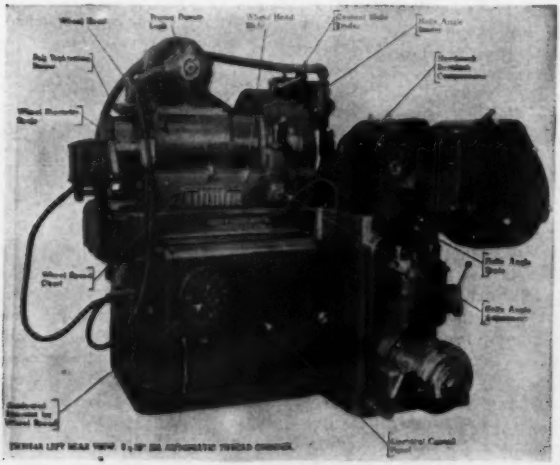

Fig. 1—Unitized design is featured in this Jones and Lamson automatic thread grinder which includes (1) wheel head, (2) truing device, (3) work head, (4) cam drum, and (5) coolant pump.

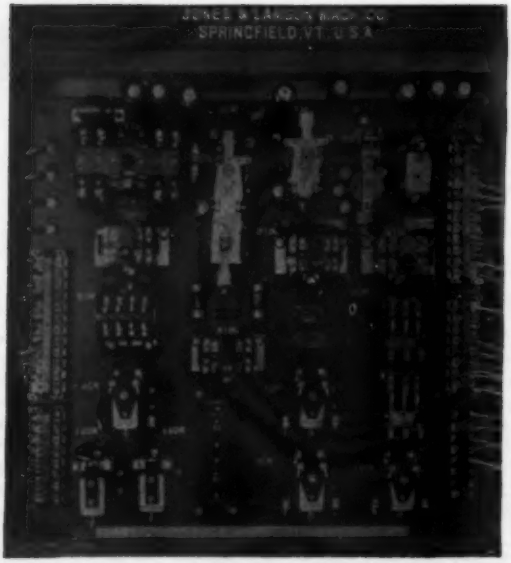

Fig. 2—Fully automatic operation of electrical control panel for 6 x 36" automatic thread grinder shown in Figure 1. Wiring and control sequence operations are centralized for easy accessibility and maintenance.

With the use of harder materials, grinding becomes the only method that can be used to cut threads. Hardened shafts can be threaded before heat treatment but threads will distort with heat treatment and also may be damaged so that a stoning operation is necessary after hardening. Threads can be ground after heat treating faster than the thread can be milled or cut on an engine lathe before hardening.

Machine Designed in Units

The J & L machine is designed in several units each having its own motor. These units are:—(1) wheel head, (2) truing device, (3) work head, (4) cam drum, and (5) coolant pump. The wheel motor is always a variable speed d-c unit. Variable speed is necessary to obtain the best cutting speed for each kind of wheel and work and to maintain the surface speed as the wheel diameter decreases. All other motors may be a-c or d-c as variable speed is not required.

Naturally, all motors require starters. In addition, control relays and limit switches are needed for proper regulation and to interlock the various machine movements and functions. Compactness, flexibility of scheme and the ability to conceal control equipment without loss of accessibility, lead to the selection of electrical control.

Each thread grinding job requires careful study for determination of the best machine cycle. The cycle is laid out in terms of one-way or two-way grinding, total number of grinding cuts, and need for truing the wheel. Some jobs can be done with a truing operation only after production of several pieces. Others require intermediate truing between successive grinding cuts. All variations between these two

ADAPTABILITY

of the HEVI DUTY CARBURIZER

An example of the adaptability of the Hevi Duty Carburizer is the use of a fixture for suspending long parts to avoid distortion during carburizing and subsequent vertical quenching. The adaptability of this type of furnace is also shown in its additional wide use in nitriding — dry cyaniding — bright annealing — and clean hardening.

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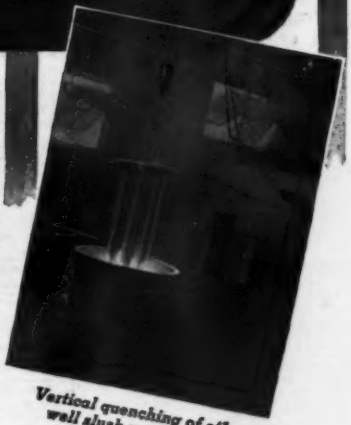

Vertical quenching of oil well slush pump rods

HEVI DUTY ELECTRIC COMPANY

extreme conditions are obtainable with the J & L thread grinder.

Typical Thread Grinding Cycle

A typical thread grinding job might be:—Grind a 4 pitch Acme thread from the solid in a shaft made of 32 - 50 material, Rockwell C 50 to 55. Analysis of this job might suggest 2-way grinding in several cuts with wheel truing at one intermediate point and before the finish cut. With the wheel running and the machine loaded, pressing of the cycle start button is all that is required of the operator. The work slide will travel between predetermined limits, pausing at each end of travel for 180° of rotation of the cam drum as required for mechanical reversal. The cam drum in its travel first throws the drive into neutral, then produces a truing feed, if called for by the set-up, then reverses the work head drive, then produces a wheel feed, and finally engages the driving clutch. These functions of the cam drum run without interruption if truing is not called for by the original mechanical set-up of the machine. If, however, an intermediate truing operation is required, the truing feed motion, thru electrical control, stops the cam drum and holds it stationary until the truing diamonds have passed over the wheel. A limit switch in the truing device restarts the cam drum for the balance of 180° of movement.

This action repeats until the last grinding cut is made. When the wheel is fed for this last cut, the feed mechanism engages a limit switch which causes the movement of the cam drum following the last cut to be stopped at neutral for reloading of the machine. Thus a fully automatic machine cycle is obtained with truing as required and with size control.

Flexibility

The flexibility of the machine and its control is illustrated by the manner in which intermediate truing is obtained with one-way grinding. Such truing is initiated by the cam drum as before, but does not require that the machine be held in neutral. Truing

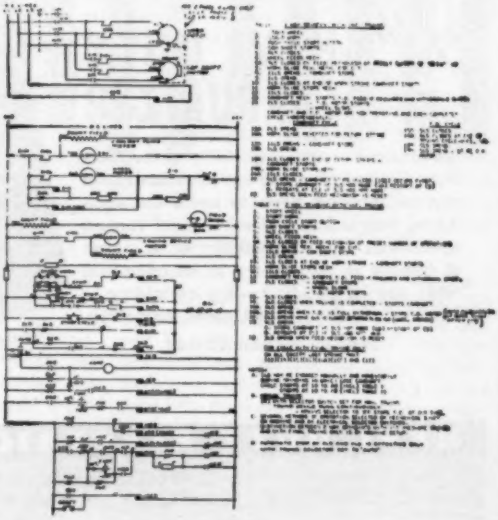

Fig. 3—Panel wiring diagram and operation sequence for one- and two-way grinding with 6 x 36" automatic thread grinder.

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DUST CONTROL *Systems*

Are designed and installed on sound engineering principles based on the accumulated experience of more than a third of a century in solving dust control problems.

If you want dust eliminated at its source; workers' health safe-guarded; production increased and a corresponding reduction in operating costs, consult Kirk & Blum.

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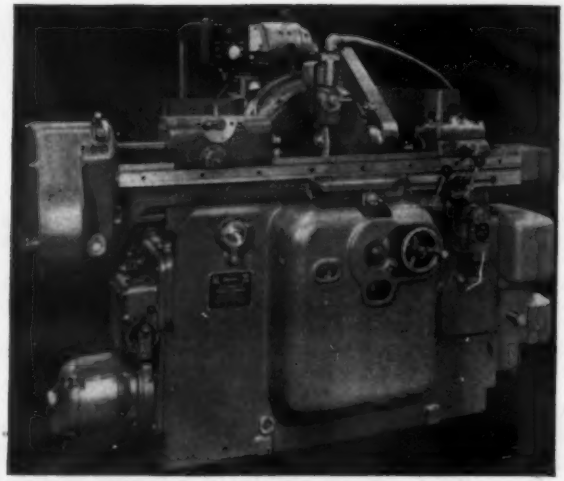

Fig. 4—Front view of 6x36" J. & L. Universal Thread Grinder.

takes place during the idle return stroke of the work slide with the wheel withdrawn from the work. When the slide reaches the end of its return stroke, grinding is automatically resumed if the truing operation has already been completed. However, if the slide returns before completion of truing, the machine is then automatically held in neutral until restored by the truing device.

All variations in machine cycle both for one-way and 2-way grinding are fundamentally controlled by mechanical settings made as part of the initial setup. These settings are permanent for each job and the cycle may be repeated as often as required merely by pressing a cycle start button.

Different forms of threads require different truing devices and any one of these can be used in the same machine. Each truing device has its individual motor and is connected to the machine by a detachable cable which includes the necessary wires for power to the truing device motor as well as for automatic operation.

The motors on the thread grinder are built to about the same standards used on any grinding machine with special attention to the wheel motor. This is a ball bearing unit because the wheel head must trip to a maximum of 30° as determined by the helix angle of the thread being ground. The dynamic balance is held to .0002". Particular attention is paid to the runout of the shaft because even a well balanced motor will become dynamically unbalanced when a pulley is mounted on a shaft with runout.

3 to 1 Speed Range

The d-c motor provides a speed range of 3 to 1. For truing, this motor is automatically slowed down to normal speed by strengthening the shunt field under control of a decelerating relay. The decelerating relay is used for smoothness and to prevent excessive pump back if a small d-c generator is used. Rapid acceleration to grinding speed after truing is controlled by an accelerating relay.

The motor for rotating the work is a ball bearing "B" type flange motor.

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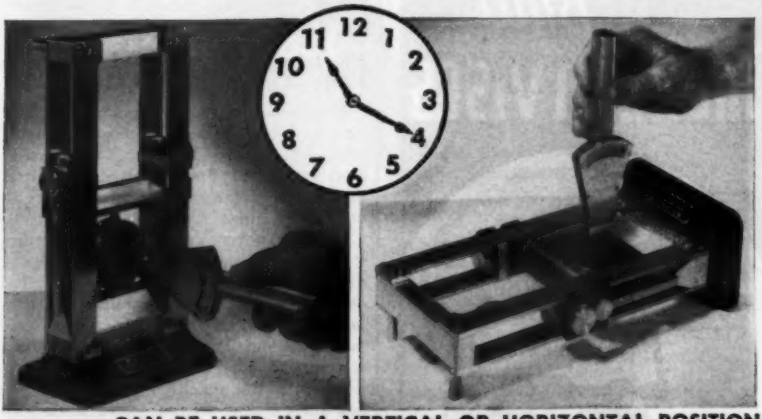

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This Internal Setting Gage (Patents applied for) was designed to eliminate the old fashioned time wasting method of setting instruments and gages by using clamps and parallels with gage blocks. Its gaging surfaces are processed and finished to millionths in flatness, thereby making possible the ultimate in checking with the minimum of adjustments. For example: if the gage is adjusted for 2" reading and a 1.875" reading is desired it isn't necessary to make a readjustment; all that is required is to wring a .125 gage block on the bottom surface of the gage, immediately giving a 1.875" check.

The gage illustrated will cover readings up to 6" and models can be made to take care of any specific job within a reasonable range. Constructed of the finest steel, it is simply and quickly adjusted by two thumb screws on each riser. Its base is 4"x6½" and overall height is 12".

During these critical times when every second counts, and manufacturers are seeking ways of increasing their production, this Ellstrom Internal Setting Gage (Patents applied for) has been an answer to at least one of their problems. Are you taking advantage of this new method? If not, make it a point to write us today for complete information and prices.

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"MODERN" VISES

"MODERN" VISES are precision-built with hardened and ground jaws for rapid production work on milling machines, shapers and drill presses.

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MODERN TOOLS
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Dynamic balance and shaft run-out are also carefully checked. The cam drum motor is a ball bearing high starting torque motor with a built-in brake. The truing device motor is a ball bearing flange type.

Electrical Control Used for Fully Automatic Operation

Electrical control was adopted at the outset because fully automatic operation of the thread grinder was considered essential. Such control permitted the design of the machine in units controlled by limit switches connected to a central control panel where any desired cycle of operation could be produced without change of mechanical design. We have found that many different cycles are necessary for a universal thread grinder. Critics say that we should furnish an electrical engineer with the machine but experience has shown that a capable plant electrician can maintain the electrical equipment with the aid of good diagrams such as we supply. We firmly believe that such electrical maintenance is easier than maintaining mechanical devices needed to produce the same functions and cycles.

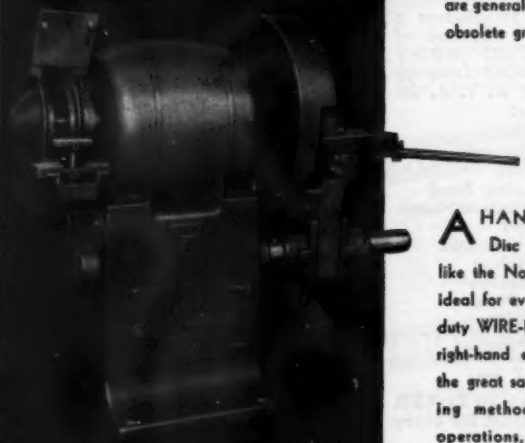
We have frequently been asked why we use a d-c control circuit. This was adopted at the outset to permit standardization and stocking of panels of only 2 types, namely, 115 and 230 volts, d-c. Any value of a-c voltage or frequency can be met by merely changing one contactor coil. Under present manufacturing conditions, this standardization is invaluable since it permits long range buying of panels. We have yet to encounter any objection from any customer.

Air Control Can Be Used

Our internal thread grinder is an air controlled machine using solenoid operated valves to control the wheel head. This head swings forward for grinding and back to the truing device for truing the wheel. For normal work the

2 handy tools in 1—

in this COMBINATION GARDNER GRINDER!



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MANY shops encounter a fair number of flat surfacing operations, but have heretofore felt that the volume on this work alone, did not warrant the installation of a Disc Grinder.

At the same time, these shops normally have a good many snagging jobs, which are generally handled on some old, half-obsolete grinding stand.

A HANDY Gardner Combination Disc and Emery Wheel Grinder, like the No. 6 machine shown here, is ideal for every such plant. The heavy-duty WIRE-LOKT Abrasive Disc on the right-hand end, enables you to effect the great savings over ordinary machining methods on many flat surface operations, which have characterized GARDNER-GRINDING for 35 years, while the emery wheel end of the machine takes care of a host of snagging jobs.

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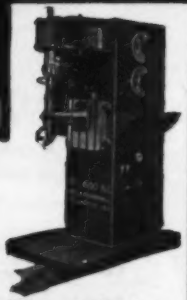

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truing is manually actuated but for a fully automatic cycle electrical program, control is needed to provide multiple truing. Such truing is necessitated by the rapid break down of the small wheel resulting from the proportional size of the work and wheel. In all other respects, operation of the internal thread grinder is essentially the same as that of the external. This is due to the increased amount of work that the small wheel had to do in relation to the size of thread being ground.

The J & L thread grinder is an excellent example of the important part the electrical engineer can play in the design of a machine requiring accurate control of a sequence of operations. The electrical equipment required must be determined early in the design of the machine in order that proper location and space for each device may be provided. In the past, the machine tool designer has given too little attention to the electrical equipment needed for a finished job. Many machine tools have inadequate provision for machine wiring, and most machine tools provide too little floor clearance for built-in controls. Planer controls use cabinets mounted on the floor beside the machine, and it is my opinion that all controls may be built that way in the future to allow easier access to electrical equipment.

Presented at the 1942 Westinghouse Machine Tool Electrification Forum.

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DoAll Band saws come in 100-ft. coils in metal boxes with slots, through which the desired saw length is easily pulled and cut off.

FREE—32-page book "Actual Performance Records of DoAll Saws". It's tabloid for quick reading.

Pat. No. 2,255,577 Design Pat. No. 127,313 Other Patents Pending

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Associated with Continental Machines, Inc., Minneapolis, Minn.

Lighting Maintenance Hints

BETTER performance and greater efficiency at lower operating costs are the direct benefits of a complete inspection and well-organized maintenance program for industrial fluorescent and incandescent lighting, according to engineers at the Westinghouse Lighting Division, Edgewater Park, Cleveland, Ohio. In addition, critical materials such as aluminum, copper, bronze, and nickel are conserved and normal life of the fixtures is substantially increased. Shop production is facilitated and accident hazards are reduced — and these are important items in the war effort.

Luminaires should be cleaned frequently. If dirt is allowed to accumulate on reflecting surfaces and lamps, illumination may be reduced 30 to 50 per cent in a short time. For maximum efficiency, reflectors must be thoroly cleaned with soap and water. When concentrating high bay reflectors are used, dirt not only reduces total light output but also alters the light distribution. For example, the efficiency of an aluminum high bay reflector was reduced 42 per cent by dirt, and the candle power was reduced 66 per cent because the distribution was changed. Therefore, illumination on the working plane was reduced about 48 per cent.

Lamp Replacements

When lamps fail they should be replaced immediately with the proper size and type. In large plants, the most effective method is to have a relamping crew patrol the plant regularly. With a properly planned system, the lost lumen hours and the cost of relamping are kept to a minimum. When fluorescent units are used, the lamp fails when the emission material on the electrodes is used up. At this point, the lamp will flash on and off and must be replaced promptly to protect the starter and ballast.

Fig. 1—**CLEANING REFLECTORS** or lenses at scheduled intervals improves efficiency of industrial incandescent lighting equipment and is extremely important where smoke and soot are heavy. (Westinghouse Photo)

Fig. 2—**IMMEDIATE REPLACEMENT** of fluorescent tubes that are burned out or beyond normal operating life insures economical and efficient operation. (Westinghouse Photo.)

Maintain Rated Voltage

For most efficient lighting with filament lamps, the luminaires should operate at rated voltage marked on the bulb. Socket voltage below the rated value will reduce light output in the ratio of about 3% per cent for every 1% in reduced voltage. A high voltage will increase light output and lumens per watt, but obviously will affect the life of the lamps adversely.

The voltage rating of a fluorescent

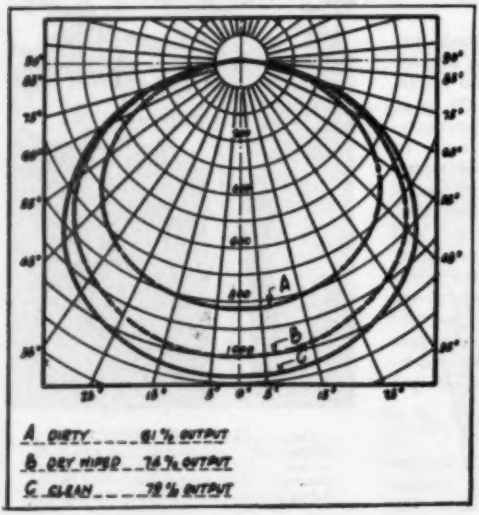

Fig. 3—**EFFECT OF DIRT ON REFLECTOR EFFICIENCY** is shown on this Westinghouse chart made from measurements taken from a fluorescent luminaire installed in a machine shop. The unit has not been cleaned for 12 months. Curve A shows an efficiency reduction from 79 per cent (when clean) down to 61 per cent. Dry wiping brought the efficiency up to 74 per cent curve B), and soap and water increased the output to 79 per cent.

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luminaire is marked on the luminaire name plate and ballast, and should be kept at the center of the specified range. Both high and low voltages reduce fluorescent lamp life and may cause starting difficulties and arc instability. Therefore, it is important to make periodic voltage checks to insure continued maximum lamp operating efficiency.

Floodlighting Maintenance

Blackened and over-age lamps waste current and lower the light output. Worn or frayed wiring can cause circuit failures. Therefore, regular cleaning and wire inspection schedules should be planned, and lamps that have passed their normal rated life should be replaced. Poor connections, faulty safety devices, and mounting fixtures should be inspected regularly. Dirty reflectors, lenses, and lamps may be cleaned easily with non-abrasive soap.

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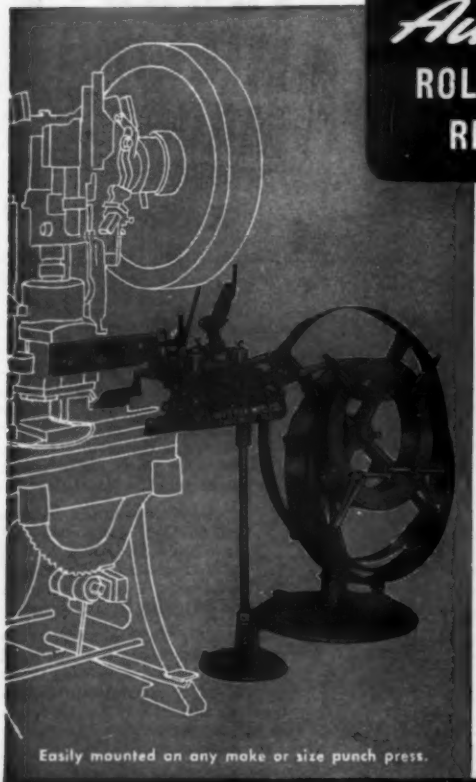

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Write today on business letterhead for new booklet, free to executives, "Fitchburg Multiple Precision Grinding."

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Six Time and Money Saving Reasons Why It Will Pay You To Install SUNNEN PRECISION HONING

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2. ***Accurate — Super-Smooth Finish*** ... Accuracy within .0001" is guaranteed —has often been held to .000025" in production work. Finish often held to 2 to 3 micro inches.

3. ***Does Not Require Skilled Labor*** ... Workers in "teens" can handle jobs in "tenths" after a few hours' instruction and practice. In many plants Sunnen Hones are operated by girls.

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WRITE for free Bulletin, giving complete data. Or, if you prefer, a Sales Engineer will call and demonstrate machine in your plant on your job.

★ In plant after plant the Sunnen Precision Honing Machine is showing production increases of from 100% to 500% with corresponding reduction in costs. Corrects errors of out-of-roundness and taper caused by previous operations. Finishes holes to close tolerances both as to size and straightness. Maintains alignment established by previous operations. Provides simple, low cost method for duplicating sizes.

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Aluminum Aircraft Link "produces high finish without ball-mouthing."

Better finish and alignment maintained on yoke for compressor.

Mild Steel Clevis Honing was used to correct errors of previous machining and maintain true alignment of the two bearing surfaces of this clevis.

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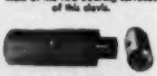
Bronze Valve. The Sunnen method of honing is used to secure a high finish and accuracy.



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Sanding Away Production Bottlenecks

(Part II—To be Continued)

By CARLETON CLEVELAND

SPEAKING before the General Motors Institute, at Flint, Mich., recently, E. B. Gallaher, of the Clover Mfg. Co., called attention to the change in finishing technique brought about by the closer tolerances obtained in foundry practice as well as by the introduction of metal die castings. These changes have increased, in a large measure, the use of coated abrasives, not only in finishing operations, but in shaping and cutting to size as well.

Because of the closer tolerances, less stock must now be removed by machining, enabling the final finishing and smoothing to be done with the various types of portable powered sanders. This in no way has minimized the importance of the machine tool. The lathe, the miller, the planer and the shaper,

Fig. 1—A Sundstrand pneumatic sander with water attachment sanding undercoat on steel plates. No. 280 or 320 grit water proof paper is used.

Fig. 2—Mall flexible shaft geared head sander with angle spindle, used in smoothing castings.

all still have their important places in the industrial plant. The change is not a superseding or replacing of one tool by another but rather a releasing of the heavier and more powerful stationary machines for heavier work.

Portable powered sanders are self-contained air- or motor-driven machines of such weight that they may be carried around without difficulty. They have been found very practical and efficient, and convenient in that they can be taken to the job with ease, a welcome addition to industrial plant equipment. There are a number of types, each maker claiming certain advantages for his own machine. Further articles will discuss some of these types in detail.

As changes in foundry practice and die casting have brought sanders into wider use, so have the increased use of portable sanders like-wise paved the way for research and further development in the manufacture of coated abrasives. By the way, this has also

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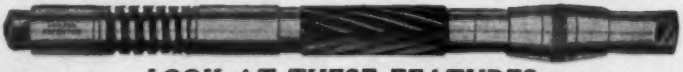

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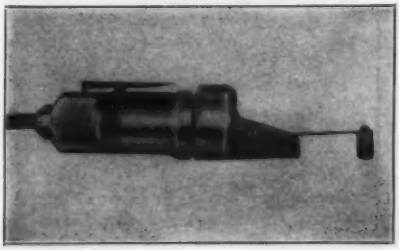

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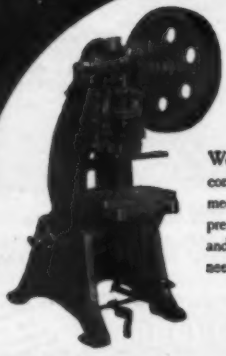

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been influenced by the more recent introduction of alloys and hard steels, which had brought, in their turn, problems in machining and finishing that did not have to be faced some years ago. All these influences have given rise to a continued improvement of the abrasive materials used in industry.

The chief minerals used as abrasives are:—flint, garnet, emery, silicon carbide, and aluminum oxide. The last two — silicon carbide and aluminum

Fig. 3—Using a Skilsaw belt sander for removing scale and grit from the metal wall of ovens.

oxide — are newer discoveries in the abrasive field, and are sometimes referred to as electric furnace abrasives. Silicon carbide is made by subjecting a mixture of petroleum coke and silica sand to the intense heat of an electric furnace, while aluminum oxide is produced by melting bauxite in an electric furnace, after which it is allowed to cool and crystalize. The latter is extremely hard and tough. The crystals are difficult to break down, even under severe punishment. It is considered a universal shop abrasive for

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Fig. 4—Oscillating pneumatic sander made by Sterling Tool Co. being used on lathe bed casting before finishing coat is applied.

all kinds of metal working. Silicon carbide, on the other hand, while extremely hard and very sharp, is not so tough as the aluminum oxide, the crystals breaking down more readily under heavy work. The dulled sheets, discs, and belts, after being dipped in oil, are useful, however, for burnishing and polishing, producing a high luster.

Aluminum oxide is chiefly recommended for use on metals of high tensile strength—carbon steels, alloy steels, high speed steels, cast and wrought irons, and tough aluminum alloys and bronzes. Silicon Carbide is used more frequently in working with metals of low tensile strength, such as gray iron, chilled iron, aluminum, brass, bronze, and copper.

In assembling the rails over which passenger elevator cars slide, the joints frequently overlap slightly and these high spots must be cut down. One elevator manufacturer in the Middle West formerly did this work with hand files, but has found a better and quicker way by using a portable electric belt sander with a No. 36 silicon carbide cloth belt, grinding the joints to a smooth, even surface, the sander doing in 10 minutes what it formerly took 2 hours to do by hand.

Another manufacturer uses a portable belt sander with a special silicon carbide belt for smoothing off the ribs left in the welding of sheet metal radiator covers. The same belt, after being used to smooth off the joints is then used to polish the entire metal cover.

A manufacturer of tourist trailers uses several air-driven vibrating-type sanders with "320 wet or dry" paper for sanding the stretcher level steel bodies of units. These sanders have a water inlet which is a part of the sander block. Outlets at either side of the block are so designed as to spray water over the work, washing as it sands and preventing the abrasive paper from "loading,"—the water and air control being automatic.

An important application of the portable power sander is in the machine tool production field, where the sanding of the filler coat of large castings presents a sizeable job. At one such plant in Ohio, the use of portable power

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Fig. 5—Smoothing a heavy casting with a No. 72 Stanley sander.

sanders has reduced sanding time 50% and with less worker fatigue.

At a Michigan plant, air-driven sanders are used on dry work for the removal of rust stains on air conditioning furnace and water heater cabinets prior to painting. And, like the machine tool builders, an eastern manufacturer of metallic doors uses power sanders in connection with finishing work for dry-sanding filler coats, as well as for sanding between finishes, cutting production costs some 40%.

At a similar plant in the Middle West, making built-to-order ornamental store fronts, elevator doors, wickets and grillwork, display and show cases, push bars, kick plates, and foot rails for bar fronts; fabricated from aluminum, bronze, brass, nickel, silver, and stainless steel, in a variety of shapes and sizes, a standard type portable belt sander is used in which the ratio of gearing has been altered to provide a slower belt speed—roughly about 700 sfm. Here emery cloth belts, ranging from 40 to 220, are used, the coarser grits being used on the tougher metals, working the surface down to a smooth satin finish.

Drum, disc, and cone sanders also have their various applications in the finishing of metal surfaces, and are commonly used with flexible shaft machines. The drum sanders are in a variety of sizes, some with an expanding rubber core, while others are pneumatic, with a clincher type inner tube,

Fig. 6—Polishing locomotive rods and link motion with Mall pneumatic drum sander.

providing a soft, smooth cushioned surface which holds the abrasive sleeve firmly in place. These drums can also be used with aerial and bench grinders. The rubberized cushion sander, in a cone shape, is used where it is necessary to reach into sharp corners and narrow slots. Because of the wide range of their applicability to take punishment by long and hard usage, these sanders find a useful place in general foundry work in the finishing of castings, dressing welds after grinding, removing solder from sheet metal work, and other similar applications.

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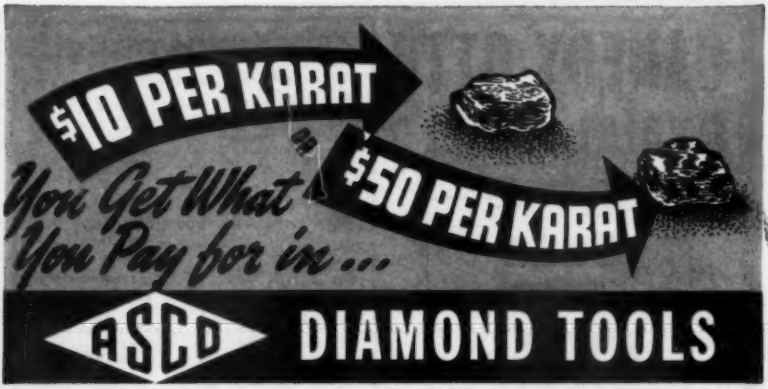

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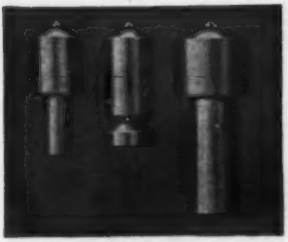

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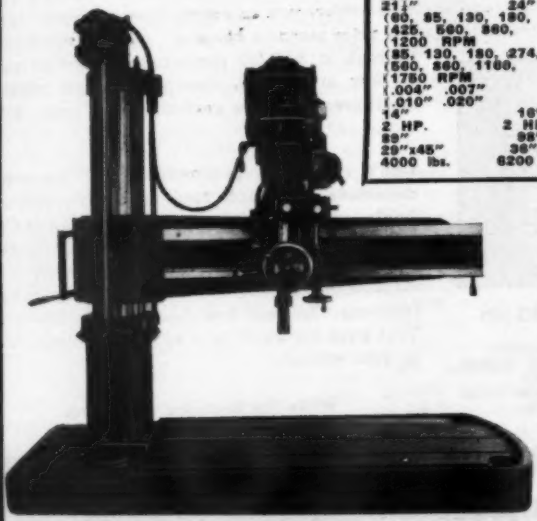

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Traverse of spindle	9½"	9½"	9½"
Hole in spindle—Morse Taper	No. 4	No. 4	No. 4
Diameter of spindle at nose	2½"	2½"	2½"
Traverse of head on arm	25½"	36½"	48½"
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Spindle speeds with 1200 RPM motor	(60, 85, 130, 180, 274, 425, 560, 860,	on all models	
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Feeds per revolution of spindle	(.004" .007" (.010" .020"	on all models	
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Eating to Win the War

By JOHN E. RYCKMAN

UNCLE Sam has found that war workers who don't eat the right food, slow up production of the guns, tanks and ships needed to win the war.

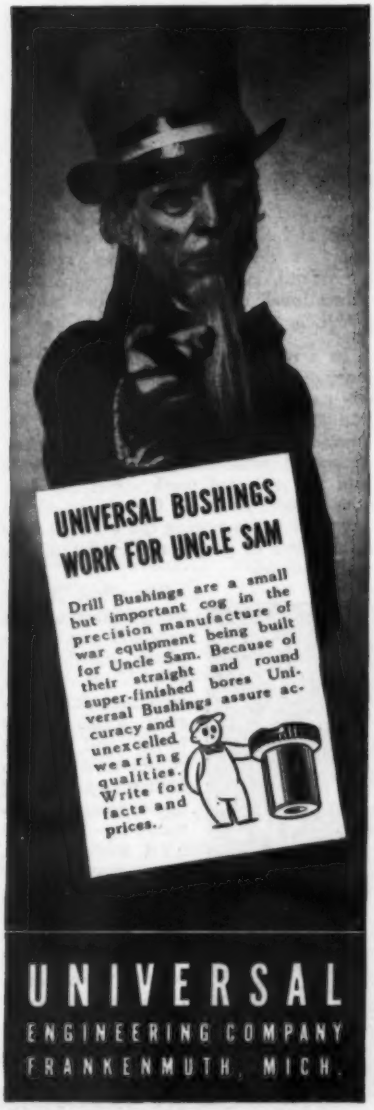
An ill-fed machinist in an ammunition or bomber engine plant may never get sick enough to be hospitalized, but his dietetic lack is bound to show one way or another, federal authorities declare. A bad disposition, an unwillingless to cooperate, or even such an unspectacular illness as an old-fashioned stomach ache—all of which may be brought on by improper diet—can spell the difference between efficiency and inadequate production, they point out.

Just to get a clearer idea of why improved eating habits are important to the war effort, multiply one uncooperative lathe or milling machine operator by 15,000,000, the estimated number of men and women who will be directly employed on war production by the end of 1942. It's as simple a problem as that.

Carrying the gospel of better diet to U. S. war workers and their families, to women's clubs, manufacturing associations, business men and school children, federal authorities on nutrition have recently embarked on a definite finger-pointing educational campaign seeking to improve long-standing dietary faults.

In a nation at war, they caution, no business can afford to have its workers anything but 100 per cent efficient. Industrialists readily agree with the premise that well-fed workers mean increased production, fewer accidents and less rejected work. But the factory owners point out that the problems involved in improving the eating habits of millions of people are multitudinous and diverse.

Since last Dec. 7, the building of vast new war production plants and the conversion of others have turned a thousand small sedate towns and quiet rural villages into 1942 versions of boom areas. Crossroads hamlets have had their populations doubled and often quadrupled between one sunup and the next; middling sized towns were taxed to capacity for more room and board facilities; even in big industrial centers, accommodations for in-migrants needed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to man the machines of war were at a premium.

Not least of the problems involved in improving eating habits of war production workers is that of food distribution. War workers and their families often cannot buy in the crowded, mushroom communities in which they live, the proper foods required for a well balanced diet. They are confronted with a paucity of actual eating places in scores of war boom towns.

Thruout the nation, thousands of such families live in their own or government-owned trailers, dormitories and housing units built by the federal government. The rationing of gasoline will have a bearing on whether some of these people, especially those living on the east coast, will be able to improve their dietary habits.

Not only the question of rationing gasoline, but the general rationing of other foods complicates the picture. The availability of water, gas and electric facilities has a definite bearing on whether the war worker gets the right kind of food, properly prepared.

The case of a certain war boom village in Illinois is in point. Authorities of the village suddenly awoke one morning to the realization that many of their wells no longer reached the water table in that area due to the emergency drilling of numerous other wells by war production plants surrounding the village on three sides. Without water, war workers living in the area were seriously handicapped until new facilities were arranged.

Similarly, in scores of towns from Oregon to Maine, food, water, fuel and housing facilities have been strained beyond the breaking point by the mobile armies of industry.

Over the country in ever-increasing numbers, war workers and their families move quickly to areas where production of guns, tanks and planes is taking place. Their patriotism and

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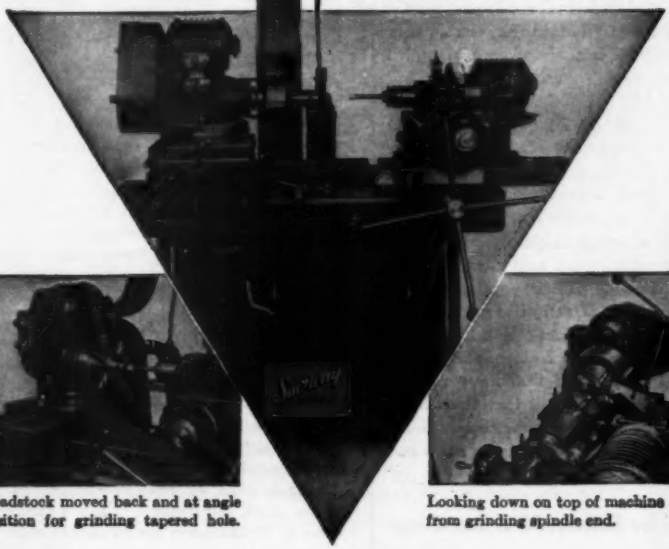

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spirits are high, and so are their American standards of living. In order to out-produce and beat the Axis, they and their families must have livable quarters, nutritious food, good water and sanitary conditions; there must be schools for their children, recreation for all members of the family, beds in hospitals for them when they are sick.

The bulk of the work in keeping America's millions of war production workers well and happy falls on the communities in which they live, on private business of all descriptions. But the government is doing its share, too.

As an example, consider briefly how the federal government is helping war production towns to provide war workers with adequate community facilities, which is the newest job to be handed to the Federal Works Agency by the President and Congress.

The amended Lanham Act provides that in any area or locality where an acute shortage of public works or equipment for public works necessary to the health, safety or welfare of persons engaged in national defense exists or impends, FWA is authorized, with the approval of the President, to relieve such shortage. This authorization is conditioned on evidence that the necessary works or services could not "otherwise be obtained when needed, or could not be provided without the imposition of an increased excessive tax burden, or an unusual or excessive increase in the debt limit of the taxing or borrowing authority."

It sounds like a big job FWA has been handed, and it is.

Brigadier General Philip B. Fleming, Administrator of FWA, has pointed out that: "Inseparable from the lives of modern, industrial workers and their families — from transportation, education, health and recreation—are roads, sewers, schools, hospitals and many other types of public construction."

Without such construction, it seems obvious the efficiency of industry would

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be seriously impaired and labor would float from one town to another in fruitless search for decent living conditions. Fortunately, FWA was prepared to start work at once. Today, thruout the nation, this federal agency is building or ready to build all the war works that can be provided with $300,000,000 worth of federal funds plus whatever local contributions are available.

A great deal of red tape has been cut in FWA since war was declared.

"A complete reexamination of the Federal Works Agency's war public works program in the light of present-day war conditions, as contrasted with those which existed when most of the 1400 projects in the nation were approved for construction, has been ordered by Administrator Fleming," explained Regional Engineer David R. Kennicott, with headquarters in Chicago.

"Unless a project is indispensable, it will be sidetracked for the duration. This means that many approved projects, some of which were given a "green light" prior to Pearl Harbor, may be abandoned. Others, which may be considered indispensable, but which were planned on the basis of conditions as they existed a few months ago, or even a few weeks ago, will undergo drastic revision as to design and specifications, with a view to eliminating any critical materials that can possibly be eliminated.

"The constantly growing shortage of all kinds of materials, due to the war production program requires a drastic curtailment of every form of construction. This means that unless a project is directly tied in to the actual production of ships, tanks, airplanes, guns, armament and the other necessities of the armed services, it will be rescinded."

Cooperating in the general plan to assist individual localities is the U. S. Public Health Service, which, working with the state departments of health, is intensifying the application of general health plans in strategic localities, with special emphasis on the control of disease, improved diets for workers, and the maintenance of effective sanitation in military and industrial areas.

The National Housing Agency, which is building houses and dormitories for the mobile armies of industry and the Federal Security Agency, which sees to it that adequate educational facilities are provided, are among many other agencies and administrations of the government seeking to provide needed assistance to war boom towns. All of these agencies are doing their utmost, but they don't pretend to have all the answers for all the problems of the legions of production workers. Many of these answers have yet to be worked out. How best to improve the eating habits of workers is one of these.

Authorities feel that this question of improved eating habits of workers is so important that serious consideration is being given to setting up factory lunchrooms where the right kinds of meals can be served. It is pointed out that this would eliminate the doughnut and coffee breakfast, which is far from adequate for the food needs of a factory worker starting off a day's work. Such a factory lunchroom arrangement, too, might take the "hurry" out of luncheon time.

The old attitude that grandfather got along without worrying about food won't do today. There aren't so many of the protective unrefined foods that grandfather had. In fact, figures show that more than 50 per cent of the food people eat is too highly refined. This makes it important to give more attention to the other 50 per cent.

At no other time in the history of this nation has there been such need for consideration of the government's new health slogan for war workers: "U. S. Needs US Strong."

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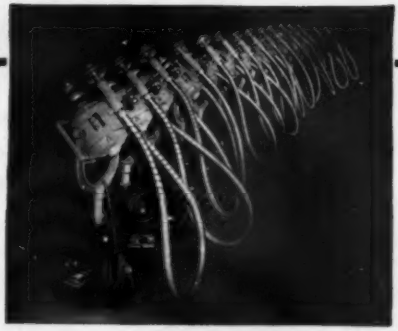

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with the variable speed HI-LO PULLEY

Here's a flexible shaft machine that does more work, a greater variety of work, and better work than other machines of its kind. The great flexibility of its shaft, the low internal stresses provided by its superior design, hold power losses to a low level, and put more of the rated power to work, *right at the cutting tool.*

High efficiency operation of any tool used is guaranteed by the variable-speed HI-LO Pulley which allows adjustment over a wide range of RPM.

Every point of superior design and performance traces back to a single factor—the word STOW on the nameplate. For Stow invented the flexible shaft. And Stow's 67 years of manufacturing experience puts Stow machines at the top of the list wherever flexible shaft machines are used.

Wire today for complete information regarding Stow Flexible Shaft Machines to fit your paricular needs.

STOW

MANUFACTURING CO., INC.
30 SHEAR ST., BINGHAMTON, N. Y.
INVENTORS OF THE FLEXIBLE SHAFT

USE THE SCHERR HEAVY DUTY COMPARITOL
FOR CHECKING DIAMETERS FROM 0 TO 8" IN 1/10000"

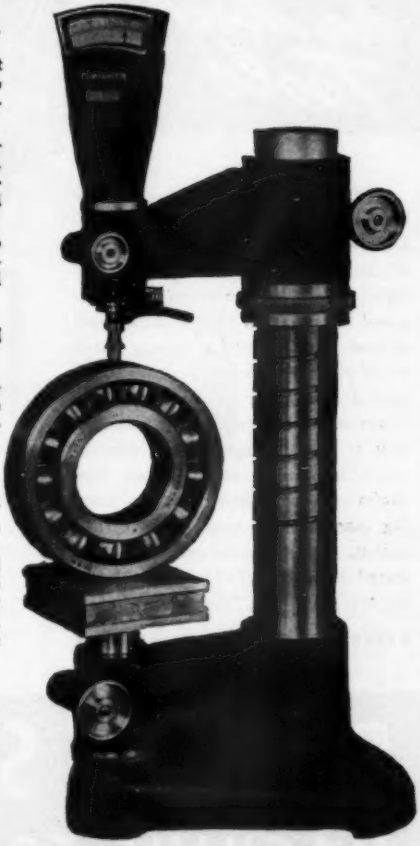
Inspection is as vital as production. The Scherr Comparitol speeds up precision inspection of plug gages, cylindrical ground work, flat work and many types of parts where close tolerances must be maintained. ESSENTIAL IN PLANTS OF PRIME and SUB-CONTRACTORS WHOSE PRODUCTION MUST FIT AND INTERCHANGE UPON ASSEMBLY.

THE SCHERR COMPARITOL:—

- Eliminates the human element of "feel" and skill from the making of close tolerance inspections.
- Reduces the inspection of finished parts in quantity to a fast, fool-proof *visual* operation, assuring interchangeability and trouble-free assembly.
- Makes it easy to give all shop tools and gages regular inspections for accuracy and wear.

OUTSTANDING FEATURES WHICH GUARANTEE ACCURACY AND LONG LIFE.

1. The measuring mechanism consists of a new patented knife-edge construction which guarantees extreme accuracy.
2. The low uniform measuring pressure of the COMPARITOL makes it ideal for inspection of delicate parts such as pins, pivots, crystals, and other products.
3. The COMPARITOL is rugged and sturdy and is used not only in the inspection department, but to quickly check actual production in the shop. Some plants have twenty or more, one located at each grinding machine.



PRICE of the heavy duty COMPARITOL illustrated is

$250.00

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GEORGE SCHERR CO., Inc. **122 Lafayette St., New York, N. Y.**

A BRACKET-MOUNTED, EASILY-APPLIED

Variable Speed Drive for Machine Tools...

● More machine tools can now have the many advantages of a motorized variable speed drive that provides all the important "in-between" speeds. Operator can choose exactly the best speed for any size, type and diameter of material in work by turning handwheel while his machine is running. No special support or bracket necessary. Gives smooth, vibrationless transmission of power, regardless of type of work. Eliminates old-fashioned lineshafts and belt shifting. Permits moving machines for most efficient shop layout. Complete information in illustrated bulletin MT-72 "New Utility for Machine Tools." Send for it.

REEVES PULLEY CO., Columbus, Ind.

● Compact assembly of constant speed motor, variable speed unit and mounting bracket for attaching to most machine tools by four cap screws.

REEVES
MACHINE TOOL DRIVE

Bonuses Built Employee Morale

THERE have been other profit-sharing plans to build employee loyalty and reward initiative. But judging by results achieved, one of the most successful was disclosed by President J. F. Lincoln of the Lincoln Electric Co., before a recent congressional hearing. It sounds like another Horatio Alger story.

The company was founded by Mr. Lincoln's brother in 1896, with borrowed capital of $150. In 1907, Mr. Lincoln emerged from school and joined the business. In 1913, his brother suffered a breakdown so Mr. Lincoln was catapaulted into the job of executive head.

Realizing his lack of manufacturing experience, Mr. Lincoln enlisted the cooperation of his men. He had the sound fundamental idea that the business would succeed if he could get the men to duplicate his own anxiety for its success.

The first step was to select a man from each department of the plant, to meet every 2 weeks as an advisory board. Every problem in operation of the business, from wages to policies was decided at these board meetings.

Back in those days, 55 hours constituted a normal work week. One of the first results of the meetings was adoption of a 50-hour week, with a compensating wage increase of 10%.

Shortly after, every employee was insured for a full year's salary at the expense of the company. Vacation with pay was the next innovation. Arrangements were made to shut down the plant the 2d and 3d weeks of August.

J. F. Lincoln testifying before House Naval Affairs Investigating Committee

Then came the matter of bonus. Mr. Lincoln believes the idea was suggested by a "more abundant life" speech of our chief executive. Any way, the board voted to try it for one year. The underlying belief was that the increased interest and effort of the men in their work would step-up output and decrease costs to a point justifying such a course.

The initial bonus was paid with some misgivings but Mr. Lincoln points out that the results warranted it. The subsequent operation of the plan is revealed by tabulations which show that as the employee compensation increased, from year to year, the productivity in sales volume per employee rose correspondingly.

A natural reaction would be to say that all this increased compensation could be balanced by price boosting. That's the astonishing part of this tale. As the workers earned more and more, they increased plant output, making it possible to reduce the selling prices of a typical horizontal type welding unit in yearly steps from $1550 to the present day figure of $360. From 1934 to 1940, the price of electrode in carload lots has been scaled down progressively from 11c to 4.8c per pound. Over the years, the percentage of profit in relation to cost has remained constant. Buyers and workers have profited. A certain percentage of profits is set aside and divided among all the employees. The men that sweat in the factory get 90% of this amount.

Executives receive bonuses based on what their actual value has been.

As Mr. Lincoln pointed out during the congressional hearing, if his men had not made the manufacturing advances for which they were rewarded with bonuses, the government would have paid many, many more millions for the welding equipment already purchased in connection with our war effort.

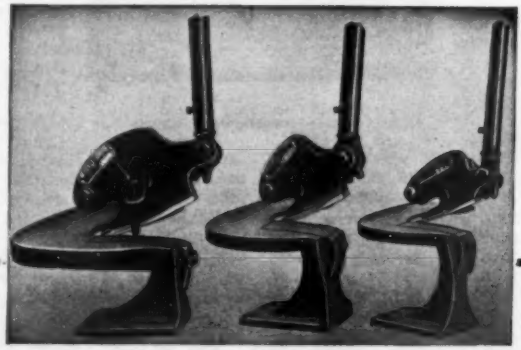
At the committee hearing, Mr. Vinson himself told Mr. Lincoln:—"I thoroly agree with you on the idea of giving large bonuses, or as much as is justified, to the factory worker, the man who is sweating and who is turning out the articles which enable you to meet your contracts . . . I have preached in this committee for some time that to stimulate production there should be bonuses. I think it is a very healthy situation to have everybody interested in a company, because they feel part and parcel of the company, and then you won't have so many strikes thruout the country."

Industrial Vacuum Cleaner

In order to avoid interrupting work, accumulated waste material coming from production and assembly operations must be removed while work proceeds. To help meet such a need the Breuer Electric Mfg. Co., 5118 N. Ravenswood Av., Chicago, has developed its new Tornado Model 117 Hi-cycle vacuum cleaner.

According to the makers, it is especially suited for continuous, heavy-duty cleaning, since the motor does not use commutator or carbon brushes. The speed at which it is said to operate, develops added suction strength required for picking up welding flux, scrap, heavy particles of dust or dirt, water and other materials or debris. The Hi-cycle motor is made to operate on 220-volt, 180-cycle current only. Unit is equipped with 20' of 4-conductor cable.

SHEAR IT CLEVERLY WITH A BEVERLY



BEVERLY Throatless BENCH TYPE SHEAR

BEVERLY CUTS ANY SHAPE — Faster!

Cuts straight—round or any irregular shape without distortion. Accurate too! Hundreds of applications on "A1A" contracts, in shipyards, airplane factories and with our armed forces. Made in 3 sizes: No. 1 for 14 gauge. No. 2 for 10 gauge. No. 3 for 3/16 inch mild steel and 10 gauge stainless. Order today!

BEVERLY SHEAR CO., 3005 W. 110th Place, Chicago, Illinois

Memo to Management RE:

MACHINE TOOL MAINTENANCE

In our War Production Program machine tools are indispensable. Difficult to replace, existing tools must be kept at an efficiency peak for the strenuous around-the-clock work required of them. The Simmons Machine Tool Corporation, specialists for 30 years in maintenance and rebuilding, offers to management these timely suggestions of proved practicability.

1 **MAKE SURE ALL MACHINE TOOLS ARE ON PROPER FOUNDATIONS AND ACCURATELY LEVELED**

This will eliminate unnecessary wear and reduce defective work. It pays to check and re-level machine tools at frequent intervals.

2 **MAKE SURE ALL PARTS ARE OILED AND CLEANED IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.**

Inadequate lubrication, particularly on multi-shift work, does irreparable damage. Use recommended lubrication. Be sure all oil holes to bearings are open and that oil and grease are clean and grit-free. Remove all chips as frequently as possible.

3 **MAKE SURE THAT ADJUSTMENTS ARE MADE AS THE NEED ARISES**

Putting off until tomorrow adjustments which can be made today unquestionably leads to greater repairs. Remember, replacement parts are almost as difficult to obtain as the machine tools themselves.

By keeping machine tools running at their maximum productive efficiency, you make possible all of the other Keep 'Em slogans—flying, rolling and firing.

Send for this book today!

SIMMONS ENGINEERED *Machine Tool* REBUILDING

SIMMONS MACHINE TOOL CORP.
1725 North Broadway, Albany, N. Y.
New York Office: 149 Broadway

Regrind Even Scores of Times

Today the most solemn issue is Unity of Purpose. Adaptability becomes a blessing. Duty is intensified by facts. Production persistently heads the worksheet. And "save" is an hourly command.

With the spirit of conserving STEEL, TIME, LABOR and MONEY, the Severance Tool Company increasingly serves the Metal, Wood, and Plastic Industries with small Rotary Power Tools for Fitting and Finishing. Supplanting ordinary Rotary Files, MIDGET MILLING CUTTERS in standard shapes and sizes are available with little or no delay. Cooperate with National Needs by ordering less than you believe you require; then enjoy at least an equivalent compensation, plus hidden savings through "Regrinding", which removes only about .004 of an inch.

Regrinding revolutionized the field of Rotary Files and Severance has regrinding histories of upwards to the unheard-of-figure of eighty times. Contact Severance and try a cutter. These are trying times.

"Chatterless" Countersinks, Tube Deburring Cutters, and Engineering Service for Special Tools also await your request. Pacific Coast users and Prospects may address Severance Tool Company, 3844 South Santa Fe Avenue, Los Angeles, Calif.

SEVERANCE
TOOL COMPANY
Saginaw, Michigan
1510 East Genesee Avenue

MIDGET MILLING CUTTERS
"Ground from the Solid After Hardening"

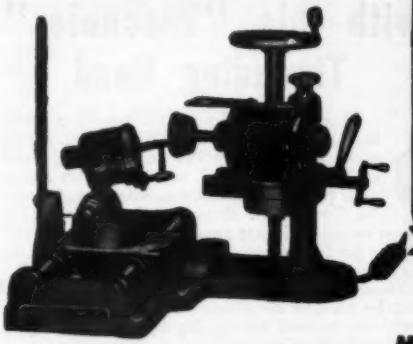
Grind ALL YOUR OWN TOOLS

to Perfect Sharpness and Cutting Uniformity

★ with a ★

HILCO
Portable
GRINDER

SPEED ECONOMY ★ ACCURACY ★



GRINDING END TEETH OF END MILL
—One of many adaptations

Sharp Tools
Mean Increased Production —
Greater War Effort

Carry to Any Department!
Use on Any Bench!

End mills, reamers, milling cutters, saws, drills — all cutting tools regardless of shape — may be ground to absolute sharpness and uniformity in your own shop, at your own convenience with the HILCO PORTABLE GRINDER. Exclusive HILCO universal head with 7 index circles provides perfect flexibility.

The HILCO GRINDER performs with utmost accuracy, top speed and lowest cost — eliminating expensive delays, waiting losses, time-consuming set-ups.

Priced at **only $395.00,** it out-performs grinders costing many times more.

Write for Circular

HILCO CORPORATION 429 W. SUPERIOR ST. CHICAGO, ILL.

External Threading at Lower Cost

with this "Procunier" Threading Head

There is no need to tie up expensive screw machines for external threading. With a drill press and a standard Procunier Tapping Head equipped for external threading with Acorn dies, you can efficiently handle threads from No. 2 to 11/16". Recommended especially for brass or materials not requiring lubricants. Work can be held within as close tolerances as you need. In many cases production can be considerably increased over screw machine set-ups—and the jobs can be handled as rapidly as tapping. The same head can be used for tapping by simply changing the chuck spindle.

Procunier Tapping Heads for both tapping and external threading offer many exclusive advantages that assure increased production, greater accuracy and less spoiled work. That's why they are used and approved by America's leading production shops. For the complete story

SEND FOR BULLETIN

giving full details, description and prices on complete line of Procunier Precision Tapping Heads to meet all needs. The new Tru-Grip Tap Holder—and also the full line of Procunier Universal Tapping Machines, hand, foot or air-operated.

Procunier Safety Chuck Company
14 S. Clinton St., Chicago, Ill.

Send me bulletins on: ☐ *High Speed Tapping Heads* ☐ *Tru-Grip Tap Holders* ☐ *Universal Tapping Machines.*

Name.....

Address.....

City..... *State*.....

PROCUNIER
SAFETY CHUCK CO.
14 S. CLINTON ST., CHICAGO, ILLINOIS

Salt Helps Defeat Heat Fag

THE hot season is just ahead—the season when, in the past, workers have wilted and production curves sagged under an oppressive summer sun.

But this year American industry is engaged in a grim, Titanic struggle to overwhelm the war production lead of the Axis powers. There is no time for a summer slump.

Quotas that sound fantastic must be met—and exceeded.

Factory lights burn thru the nights. Working hours are longer. Millions of new, inexperienced workers take their places at machines and benches.

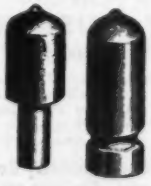
As the pace grows faster and the days grow hotter, production experts, industrial physicians and safety engineers will make every effort to safeguard the physical fitness of American workers—to see that there's no seasonal summer lowering of production and efficiency—no increases in accidents and mistakes.

Interestingly enough, an effective weapon against hot weather letdown is common salt.

Overcoming Heat Sickness

Until recently, one of the most baffling causes of disability among employees has been heat sickness or heat cramps, particularly prevalent among workers engaged in hot, heavy work. In its milder forms, heat sickness very often not is recognized as such, showing up as a loss of energy, increased fatigue, or a general letdown in productive output—a situation extremely undesirable in war times.

Research has shown that loss of salt from the body, thru excessive sweating, is a contributing factor. There is a very simple explanation. Every body cell, the blood stream, the spinal cord, the brain, must contain a certain amount of water to maintain the proper chemical balance necessary for normal body functions. Unless salt is present in proper quantities, the various parts of the body cannot hold the necessary amount of water. When body salt is lost thru excessive sweating and not replaced promptly, cells and other parts of the body lose water, upsetting the delicate chemical balance of tissue and body fluid. If the salt loss is slight, the first reaction may be a tired, uncomfortable, letdown feeling. If this upset condition is allowed to continue, however, actual heat sickness and muscle cramps occur, which may be quite



FOR DEFENSE

KARELSEN'S DIAMONDS KEEP THE WHEELS OF INDUSTRY TRUE

DIAMOND POINTED EMERY WHEEL DRESSERS

¼ KT. TO 10 KT.

IMMEDIATE SHIPMENT

Send for Prices *Specify Holder*

"If its made of Diamond—Ask us First."

E. KARELSEN, INC. *Established 1852* 56 W. 45th St., New York, N. Y. Tel. VAN. 6-5688

ELECTRO-MATIC RECTIFIERS

SPECIFICALLY DESIGNED FOR INDUSTRIAL USE—

Precisely engineered to meet increased demand for dependable rectifiers ..... In a range of 42 voltage combinations - from 125 to 3000 watts capacity.

SIMPLE in operation. COMPACT—can be built directly into your equipment. Many other features.

With the NEW AUTOMATIC TIME DELAY SWITCH (in larger units) to protect rectifier tubes. A "money saver and production increaser"—prevents throwing the load on tubes until properly warmed up, etc.

NEW BULLETIN "61" gives complete information. WRITE for your copy.

ELECTRO-MATIC PRODUCTS CO.

Makers: NEUTROL Electro-magnetic Chuck Control

2235-37 NORTH KNOX AVE., CHICAGO, ILLINOIS

capable of causing death in extreme cases.

Then, too, salt has been found to serve another important function, uniting with undesirable chemicals in the blood stream, transforming them to substances which can be thrown off thru the bowels and kidneys, thus ridding the body of materials which might prove harmful if retained.

Look Out for the Mild Cases

Doctors and nurses know that a sure cure for severe heat cramps is an intravenus injection of brine containing a high percentage of salt. This is standard treatment for all hospital cases. The greatest hazard, however, is not the hospital case, but the thousands of less severe cases which go unnoticed, but take their toll in production. Even a slight salt loss saps energy and slows muscular coordination and reactions. When this happens, men feel tired and uncomfortable, mistakes increase, individual producing capacity goes down; and, as strength and efficiency are undermined, men become careless and serious accidents can easily happen.

To prevent these unnoticed, but dangerous cases, salt lost thru sweating or other bodily functions should be replaced at the same time and in the same ratio as the loss. Unfortunately, our bodies do not store away extra salt for future use, but dispose of it almost immediately thru the kidneys. So, if we are to keep our body salt up to standard, we must get a certain

Have you our Engineering Data Sheets on the new line of

BABY GUSHER

Machine Tool Coolant Pumps?

Made in four types; 1/30 and 1/10 h. p. for small machine tools and machines requiring from 4 to 10 G. P. M.

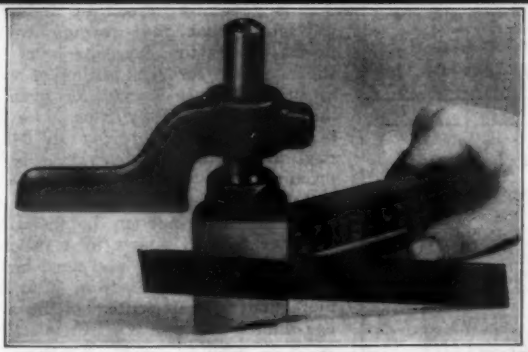
Write for descriptive literature.

The Ruthman Machinery Co.

1819 Reading Rd., Cincinnati, Ohio

NEW TYPE TOOL HOLDER

-- FOR CUTTING OFF IN LATHE --



POWER FEED CUT-OFF

●

No Dig—
No Lift—
No Climb—
No Chatter—

It's the New Way to Cut-off!

Different from any other cut-off tool holder—because it has a steady-rest that rides over the work when cutting off in a lathe. It holds the cut-off tool steady, preventing chatter. Instead of breaking the chip it peels off a continuous ribbon. Operates perfectly on power-feed cut-off, even if the bearings are pretty well shot.

Eliminates Cut-Off Problems!

Cutting-off in a lathe has always been a most difficult operation, because of the tendency of the stock to jump or lift, climb on the tool, break it and ruin the work.

This is impossible with the Lombard Power-Feed Cut-Off Tool-Holder, because the tool and stock are both held steady in relation to each other, which assures safe, smooth cut-offs. Lengthens life of cut-off tools tremendously.

PRICES

For 12" to 14" Lathe $14.75
For 16" to 18" Lathe $15.75
Extra Heavy Duty Model $2.00 addit.

Order Direct! Money-back Guarantee!

LOMBARD MANUFACTURING CO.
16217 Linwood Ave. Detroit, Mich.

NUMBERALL
Numbering Machines
Automatic and Hand Operated
for stamping in Metal, Fibre, Plastics, etc. Do faster and better work than Single Steel Stamps.
For Marking Metal Parts, Name Plates, Metal Checks, etc.
Write for Catalog.
NUMBERALL STAMP & TOOL CO., Inc.
Huguenot Park, - - - Staten Island, N. Y.

Welders for Defense

Any two Knock-Out welders can easily be connected in series to combine the amperage of both machines for occasional jobs requiring large capacity. Separated, they can be used on different jobs within their capacity.

Write or Wire for Bulletin W42-7H

K. O. LEE COMPANY
Aberdeen, South Dakota

amount each day. The average person can obtain the necessary daily quota from the salt used in seasoning his food, but workers engaged in heavy work or long hours should have extra salt to compensate for the loss thru sweating.

It is generally agreed by industrial physicians that the average worker needs, during the day, one level teaspoon of salt for each gallon of water he drinks. Since workers on even the hottest jobs will rarely drink more than 2-gallons of water during an 8-hour day, the extra quota required is approximately 2 level teaspoons, approximately 60% more than the average diet contains. Men not on hot jobs will consume from 2 quarts to a gallon of water during the day and need half to a full teaspoon of salt, from 10 to 25%, more than the salt content of the average diet.

Workers Who Sweat Need Salt

Various methods are employed to supply salt to workers. Some plants add the proper percentage of salt to drinking water systems. This method, while entirely satisfactory, involves the installation of machinery and some attention to insure that the proper amount of salt is present in the water.

The use of salt tablets and tablet dispensing machines, placed near drinking fountains or on portable water coolers, has become increasingly popular. The tablets contain regular table salt,

JFS - CUB
VARIABLE SPEED TRANSMISSION
For "A" section V-belts—3.3—1 speed range—perfect belt alignment in all positions. Priced so low that no shop or machine need go without infinite speed selection. *See your dealer or write* **$16.50**
Standard Transmission Equipment Co.
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FATHER CUTTING TOOL:
"You know Ma, I'll bet that Baby Kut Kost is as tough as old man 18-4-1 High Speed Steel. I watched him tear into those big turbine shafts just about three times faster and I'm telling you Ma, you just couldn't help feeling proud. And is he HARD!"

MOTHER CUTTING TOOL:
"Dad, do be careful please. I feel like bragging myself at times. 'If 'a man is what he eats', Baby Kut Kost should be strong and tough because I feed him the best of metals and mix 'em up very carefully—you will have to make him 'hard', Dad. You know more about the Hardening Process than I do."

GENERAL TOOL AND DIE CORP.
555 PROSPECT ST., EAST ORANGE, N. J.

HUNDREDS IN USE

—where Performance Counts!

FLEXIBLE SHAFT MACHINES

SIZES ¼ HP to 2 HP MOTOR

1 to 2 week deliveries *(on most models)*

These machines, known for their sturdy construction, enjoy wide use in many War Producttion plants; tested and approved by several engineering groups. Available in Bench, Overhead and Floor Models; Single or Multiple Speed.

NET PRICES

	SINGLE SPEED		*MULTIPLE SPEED*	
H.P.	**FLOOR**	**BENCH**	**FLOOR**	**BENCH**
1/4	$88.75	$80.50	$99.00	$93.50
1/3		77.00	110.00	104.50
1/2	115.50	110.00	137.50	127.00
3/4	137.50	121.00	159.50	
1	170.50		192.50	

LARGER SIZES MADE

Your inquiry will have our prompt attention!

ACME TOOL CO.
200 CHURCH ST.
NEW YORK

compressed under pressure to a uniform 10-grain size, which is approximately the size of an aspirin tablet. They are swallowed whole with a drink of water. No salt taste is noticeable and the tablets dissolve within 30 seconds after being swallowed.

Educational posters, placed on bulletin boards and near drinking fountains, are used to point out to workers the importance of replacing salt lost thru sweating, and encourage them to take salt tablets, thruout the day, whenever they take a drink of water. Eight 10-grain tablets is the equivalent of one level teaspoon of salt, which means that workers engaged in light to medium work will require from 4 to 6 tablets daily; workers in medium heavy work from 8 to 10 tablets; and workers in extra heavy, hot work from 12 to 15 tablets during an 8-hour day. Salt Tablets can also be obtained with 70% salt and 30% dextrose for extra energy.

In times like these when production is so vital, welfare of the workers and maintenance of their ability to produce, must be conserved. Heat-Fag should not be permitted to take its toll.

Help Blast the Axis—
Buy U. S. War Savings Bonds and Stamps

DOUBLE YOUR DRILL PRESS CAPACITY

Minutes are Seconds with the new TWISTITE Vise.
Opens to full capacity in one second.
Speed Defense Production with this New Vise.

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THE NO. 3 WIGGLESWORTH SMALL MILLER

A NEW HIGH SPEED SMALL PARTS MILLER WITH AUXILIARY POWER FEED

PLUS

MOTOR IN BASE DRIVE
TIMKEN BEARING SPINDLE
SIX FEEDS AND SPEEDS
BUILT IN ACCURACY

WRITE TODAY FOR DESCRIPTIVE FOLDER

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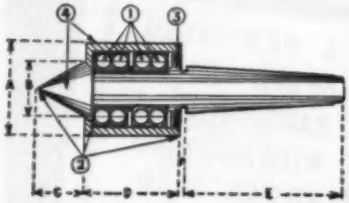
191 BENT ST. CAMBRIDGE, MASS.

QUADRO *Precision* ★ ★ ★
LIVE CENTERS

4 REASONS WHY QUADRO *Precision* LIVE CENTERS MEET EVERY SPECIFICATION



SPECIFICATIONS—DIMENSIONS AND PRICES

Morse Taper No.	A	B	C	D	E	F	Combined Radial-Thrust Load At 100 R.P.M.	Net Price
2	1¾	⅞	¾	1 13/16	2⅛	⅛	1600	$23.00
3	1¾	⅞	¾	1 13/16	3 7/16	⅛	3300	$25.00
4	2 15/32	1	1 5/16	1 13/16	4 9/32	9/32	7500	$35.00
5	2 9/16	1 3/16	1	2 5/16	5 7/16	9/32	12000	$47.00

1. **FOUR (4) ROWS** of precision BEC-4 specification bearings.
2. **Note SHORT OVERHANG** assuring rigidity and accuracy—eliminates "chatter".
3. **Positive FELT-SEAL** — excludes dirt—retains lubrication.
4. **HARDENED AND GROUND CONE**—point accurate to within .0002.

★ ★ ★ **FISHER TOOL CO.**

226 LAFAYETTE ST., NEW YORK, N. Y.

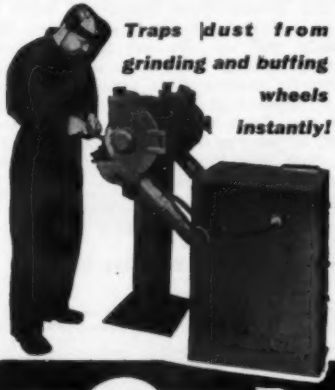
Rescue

VITAL MACHINERY FROM ABRASIVE DUST

The St. Bernard

Is dust running wild in your plant, injuring valuable machinery and menacing your employee's health and efficiency ?

Rescue your equipment by harnessing this enemy with one or more **TORIT Self-Contained Dust Collectors.** Easy and economical to install—only a few pieces of piping or flexible tubing required. Torits are portable and may be placed wherever needed. In many instances the installation of several TORIT DUST COLLECTORS has been found more practical than one small central system.



Traps dust from grinding and buffing wheels instantly!

GET THE FACTS—Write today for bulletin giving Torit advantages, numerous uses, construction and operation data, models and prices. Let us solve your "dust control" problem.

TORIT MANUFACTURING CO.

303 Walnut Street, St. Paul, Minnesota

TORIT Dust Collectors
SELF-CONTAINED UNITS

"National Emergency" Alloy Steels

Joseph T. Ryerson & Son, Inc., Chicago, have just announced addition of the new NE (National Emergency) Alloy Steels to their warehouse stocks. NE Alloys are those new "lean" alloy steels established by the metallurgical staff of the War Production Board to help conserve nickel, chromium, vanadium, etc., for the duration. To make these new Alloys quickly available, Ryerson has planned a representative stock of hot rolled rounds in sizes ranging from ½ to 7" in diameter and in 6 different analyses. Heretofore, these new steels have not been available for experimentation and it has been difficult to obtain even small lots necessary for determining suitability of the steels for an application. Now, manufacturers can get small lots for treating and testing in specific applications. This method will assure proper selection of steels, which can then be ordered confidently in production quantities and the user will know just what to expect.

Exact distribution among the Ryerson plants is not yet decided, but initial stocks will consist of 6 analyses:—(1) carburizing alloys, NE 4023 and NE 8620; (2) medium hardening alloys, NE 4042 and NE 8744; (3) high hardening alloys, NE 4047 and NE 8749. It is confidently believed that these new alloys, properly selected and heat treated, will satisfactorily replace the higher alloy content steels formerly used, except in very special applications.

Carburizing Grade		Medium Hardening Grade		High Hardening Grade	
NE (National Emergency) Alloy Steels	Replace AISI & SAE	NE (National Emergency) Alloy Steels	Replace AISI & SAE	NE (National Emergency) Alloy Steels	Replace AISI & SAE
	2300		2330-35		2300
	2500	NE 4042	3130-35		3100
NE 4023	3100	NE 8744	4130-35	NE 4047	3200
NE 8620	4100		5130-35	NE 8749	4100
	4600		6130-35		4600
	5100				6100
	6100				

During the past few years many different types of alloy steels have been developed for manufacture of all kinds of machines and equipment. Many of these steels contain relatively large quantities of nickel, chromium, vanadium, etc. They were developed by research and experience to meet specific requirements. Since most alloying elements were plentiful, it was metallurgically sound to create these highly specialized steels to produce maximum physical properties. Because current needs for war production alloy steels are so great, the supply of these various critical alloying elements is entirely inadequate. This problem has forced development of new steels containing a minimum of alloying elements but of a composition balanced to produce adequate physical properties.

To develop "lean" alloy steels all research records were carefully examined. The WPB put the best metallurgical brains in the country to work on the problem. The outcome was creation of a number of analyses now called NE (National Emergency) Steels.

The Metallurgical Section of WPB is very anxious to know how the new NE Steels will do the job and conserve scarce metals. Therefore, all users are urgently requested to report details of each operation such as forging—machining—heat treatment response—tool life, as well as the results of tests, etc. so that this information can be made available to others.

While at the present time, only limited heat treating data is on hand—Ryerson will furnish all available information with each order to give users as much help as possible.

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New facilities and expansion of output makes reasonable deliveries possible now to essential war plants on these vital inspection devices.

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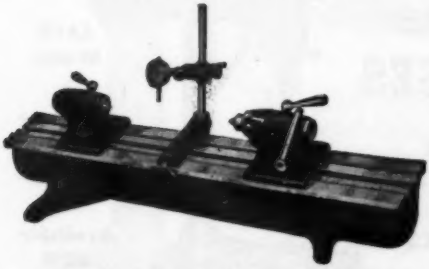

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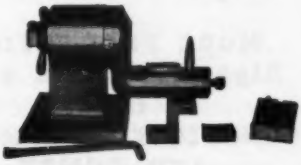

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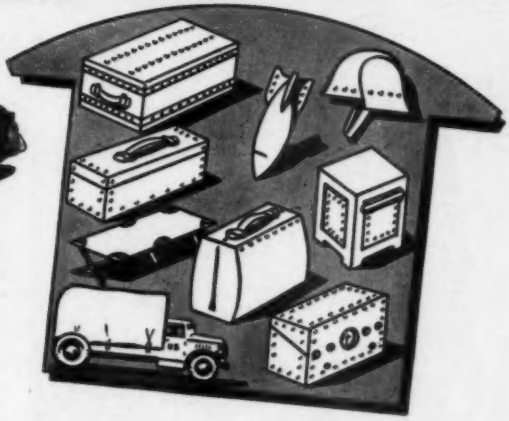

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Table: 30" x 12".
Range: 28" longitudinal, 12" cross, 16" vertical
18 Speeds: 30 to 1500 rpm
18 Feeds: 1/2" to 22"

VAN NORMAN RAM-TYPE UNIVERSAL MILLERS substitute quick, mechanical "headwork" for a lot of slow and fussy headwork on the part of operators. To change from vertical to horizontal or angular milling, it is necessary only to unclamp, swing the cutterhead to the new position desired, reclamp . . . and proceed with the next cut. Combining these adjustments with movements of the ram in or out over the column, it is possible to carry many jobs straight to completion, without either resetting the work on the table, or detouring it to another machine. This means that risk of error is minimized, spoilage of critical materials reduced, and that more time is employed in actual productive work. Also, it means that new men can be more quickly trained to adequate competence, because of this exceptional ease and convenience of operation. Add to these advantages the strength and rigidity which are the final safeguards of Van Norman accuracy, and you can see why Van Norman Ram-Types are the outstanding toolroom and short-run production millers in America's war industries.

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Semi-Steel body, ribbed construction, hardened and ground steel reversible jaws—Made to stand the gaff. We are proud to offer such Hi-quality at low cost.

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BEHIND THE LINES..

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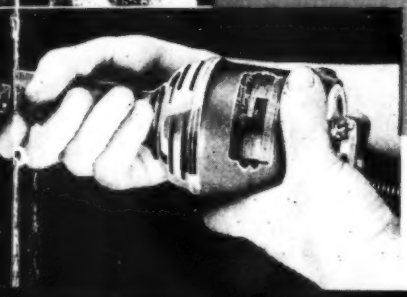

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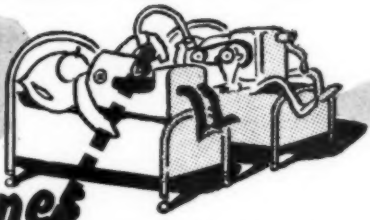

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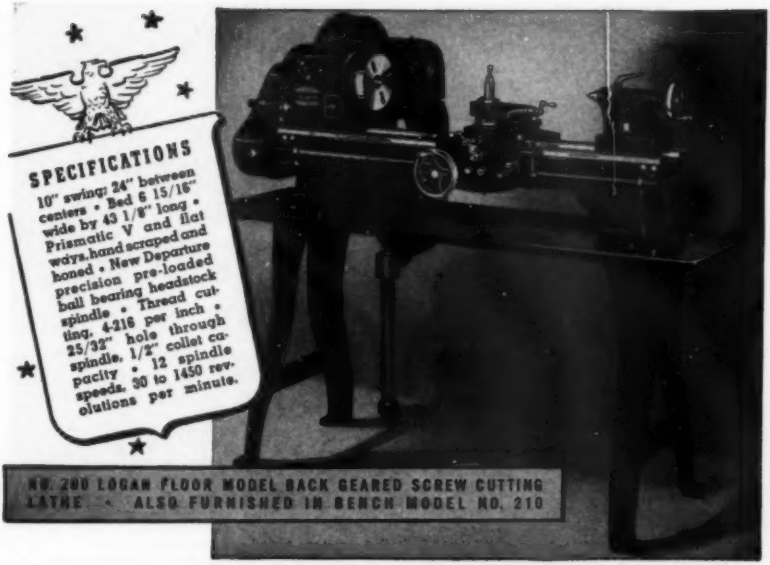
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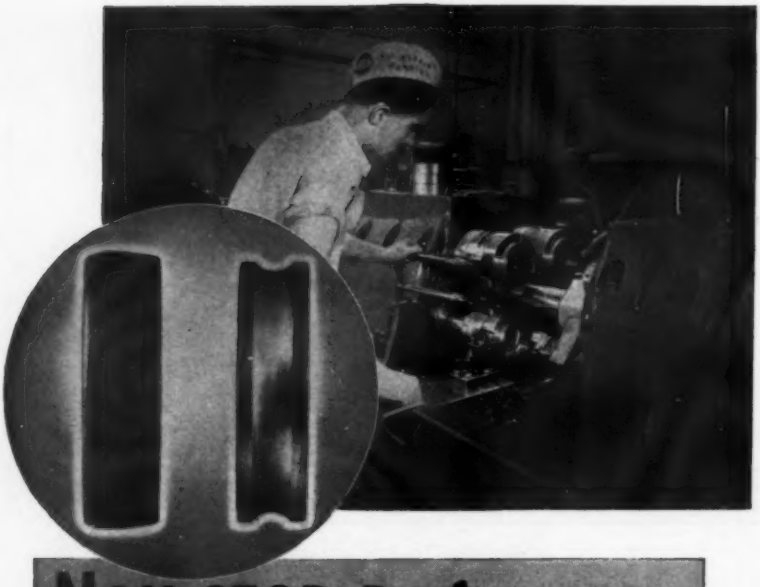

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Welding Aids Production

By G. G. LANDIS of Lincoln Electric Co.,
As told to FRANCIS A. WESTBROOK, M.E.

EVEN industries with high priority ratings find it difficult, at times, to replace needed machines or to obtain machine parts when breaks or the unusually heavy wear now being incurred make immediate replacement essential. And as industry is under the strongest moral obligations to maintain all-out war production, it must take all practicable means to avoid loss of valuable time or interferences with production schedules. In this connection, welding provides a means of quick fabrication for the construction of new machinery and for the replacement of worn or broken parts, and it is being used successfully by more and more manufacturers in all branches of industry.

It makes little difference whether the machine to be constructed, reclaimed or repaired is large or small, so far as the effectiveness of arc welding is concerned. This is well illustrated by the examples given, which have been taken from actual practice. It is interesting to note that in every case, the result was a construction job that was physically stronger and more durable than the machine or part replaced. Further, it was considerably

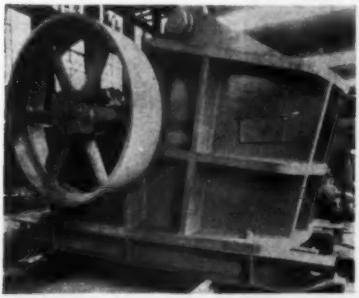

Fig. 1—Sturdy Arc Welded Construction increased the capacity of this jaw crusher 100%

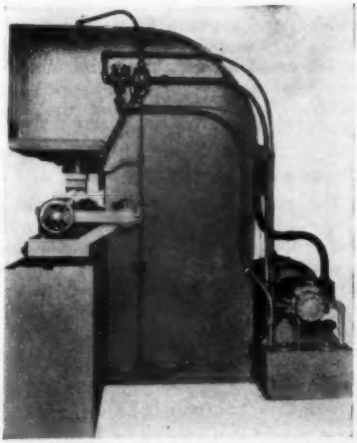

Fig. 2—Side view of a heavy press designed to align airplane struts and gun barrels.

less expensive than replacement thru purchase of new equipment. It is also generally true that there is much less loss of time.

Fig. 1 shows an arc welding job as applied to a large machine. This is a jaw crusher, the capacity of which was increased 100% by welded construction over one of comparable size made by another method. Heavier usage was obtained with no threat of failure. In fact all welded crushers have proved themselves able to double the amount of output over the older types, one reason for this being that welded steel construction makes it possible to use curved crushing plates, which could not be used with the former type because of the likelihood of failure. It was also found that the all-welded crusher reduces the material to approximately half the size of the output of the old crushers.

The engineers of the O. C. Keckley Co., Chicago, when confronted with the problem of designing straightening presses to be used for aligning airplane struts and gun barrels turned to arc welding as a fabrication method. This proved not only economical, but exceptionally strong and fast as well. Fig. 2 is a side view of the press which they designed. It is made up of standard steel plates, built in sections, and welded into one integral unit. It has a capacity of 350 tons, a 10" ram stroke, a table 18 by 12" and a 9" throat. Power is supplied by a 25 hp motor. The entire press weighs 32,000 lbs.

Fig. 3—One of Le Tourneau's giant scrapers fabricated by arc welding.

A still larger press, to be used for the straightening of anti-aircraft guns, is reported under construction by the same company. In this instance, also, arc welding will be used as the principal means of fabrication.

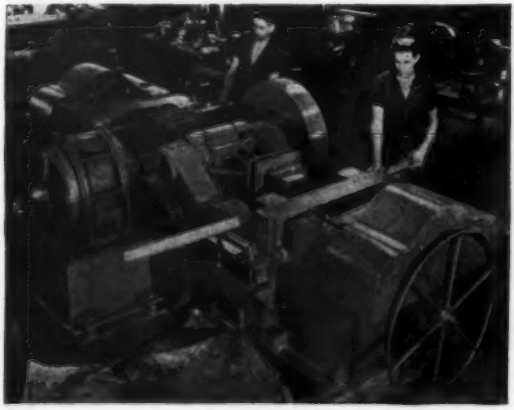

Fig. 4—Heavy duty Sutton gag press, capable of bending a 4" square steel section. A 40 hp motor gives a 75-ton thrust to the rams.

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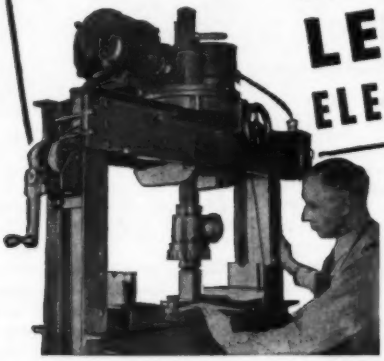

● That's speed! And the unusually rigid frame construction makes this press *safe*, too. There's nothing like it for straightening, bending, upsetting and flattening. On these and similar jobs within its capacity, the LEMPCO Electric Press does the work faster and safer than bigger machines that cost much more. 40 and 60 ton models. Good delivery. Use coupon to get full details.

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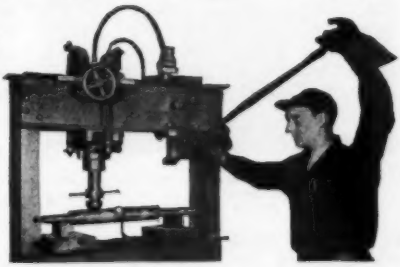

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The huge scraper pictured in Fig. 3 is an immense boon to quick and efficient ground leveling operations prior to the construction of new war production plants. Few items of heavy machinery are called upon to take punishment as severe as that inflicted on earth-moving equipment like this large machine, built by the R. C. Le Tourneau Co. It is of all arc welded construction, providing for both strength and lightness, and has proved its ability to withstand the severe strains incident to the service conditions it must meet. The combined equipment shown

Fig. 6—"Spud" peeler, modernized by arc welded construction—a boon for the kitchen police at army camps.

in the photograph weighs approximately 88,500 lbs., including the load of dirt. Its gigantic size will be appreciated by comparing it with the size of the driver.

This machine is driven by a pair of 200 hp Diesel engines. There are 4 forward and 2 reverse speeds. Among the important welded parts which must stand up under the terrific service conditions, are the box beams, axles, tire wheels, many lugs, levers and parts of the transmission gears, gear rims, axle

Fig. 5 — All-steel arc welded mop wringer, lighter and stronger than its old-style predecessor.

tubes, transmission housing, and scraper bowl. The fact that the equipment is powered with 2-200 hp Diesels and that this power is by no means gently applied will give a good idea of the structural strength required and what welding can withstand.

Fig. 4 shows a straightening press made by Sutton Mfg. Co., Bellefonte, Pa. It is capable of unbending a piece of steel with a section 4" square. Needless to say, the press must be very strong and as the same time it must be as light in weight as practicable.

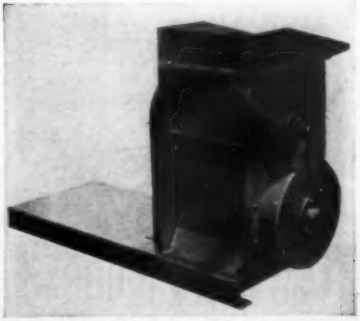

Fig. 7——Ice crusher fabricated of welded sheet steel.

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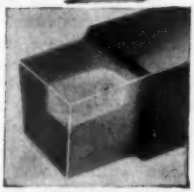
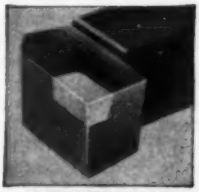


STYLE No. 3



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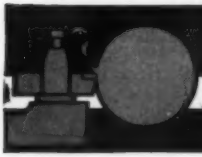

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Pulls dust away from grinding wheels and returns cleaned air to room. Complete self-contained dust collecting system. DUSTKOP is operated by GE ¼ hp, continuous duty motor, driving multiple-blade fan. Compact, portable, low priced.

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• Write for Bulletin A-500

Consequently arc welded construction was employed.

The illustration shows 2 operators using this machine. The unit, commonly known as a gag pres, is powered by a 40 hp motor running at 900 rpm. This power gives a 75-ton thrust to the straightening rams, which are moved toward their respective sides by means of a crank.

Arc welding was employed at first to save patterns, which is one of its frequent advantages. But other advantages soon became apparent. In a machine of this type it is desirable that the main frame be made comparatively high. This was easier to accomplish without making the structure unduly heavy by using welded construction because sections of the arc welded material may be of smaller dimensions than corresponding cast sections. The wheel at the right in Fig. 4 was also fabricated by welding. The covers for the wheels, the I-beams under the motor and the entire main frame were likewise welded to provide strength, durability, lightness and economy.

Arc welding is just as important a factor in such considerations, with respect to small machines as large ones. Machines and parts for replacement in this group are often just as difficult to obtain, and long delays are by no means uncommon. In fact, before the war is over, replacement parts are likely to be scarce, even for the lowly mop wringer. All welded construction has been adopted as the answer to this situation.

Fig. 5 shows an all-steel, arc welded mop wringer weighing only 12 lbs, as against its old type predecessor which weighed 16½ lbs. In addition to making a hit with the scrubwomen who have so much hard work to do in keeping our war plants clean and in condition for exerting maximum efficiency, this new model of wringer, fabricated entirely from smooth-lined

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NEW Dearborn Automatic Chucking and Indexing Fixture

Work held by draw in collets. Collets open and close automatically. Work automatically ejected. Indexes without loss of time for milling 1, 2, 3, 4, 6, 8, 12 or 24 sided pieces. Minimum set-up time required. Speeds up production. Positive and accurate in operation.

J. W. DEARBORN

72 S. CLIFF ST. ANSONIA, CONN.

stampings, is neat in appearance and practically unbreakable. In addition, the improved features incorporated in the new welded design make it easier to use. Such advantages naturally give the new product plenty of sales appeal. It is manufactured by the Geer-Pres Wringer Co., Muskegon, Mich.

A modern potato and vegetable peeler, which may help lighten kitchen police duties, together with the stand and discharge box, shown in Fig. 6 are all of welded construction. The welded steel stand supercedes a bolted stand and is superior in strength, durability and lightness. At the same time it has been possible to reduce the price from $28.70 to $12.64. It can be built any height required, obviating need of separate patterns for various leg lengths. A de-greaser basket which is used in conjunction with the stand is also arc welded.

The all welded ice slinger, illustrated in Fig. 7 shows superiority over previous methods of construction. Most of the parts are made from 3/16 and ¼" mild steel plate, sheared, formed in a brake and assembled in fixtures. The inside screw feed is also of welded construction.

Fig. 8 shows the sturdy parts of a flanging machine manufactured by Blue Valley Machine & Mfg. Co., Kansas City, Mo. At the left is the main housing which has a base 16 by

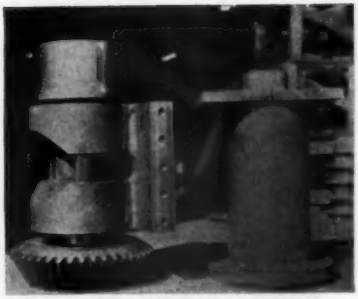

Fig. 8—Sturdy arc welded parts of a flanging machine.

16 by 10⅛" in diameter. Great strength is assured by the arc welding which fuses the parts together and deposits a smooth bead joining the two round shapes to the square base plate.

At the right of the same illustration is seen the main hydraulic cylinder. This is made from seamless steel tubing, 8½" in diameter by 19" in height. The head and base are both welded.

The low manufacturing cost of this flanging machine resulting from arc welding makes it possible for any plant or shop to own and operate its own flanging equipment.

The number of examples could easily be expanded greatly to show what is being accomplished by means of arc welding in the war production industries, and others.

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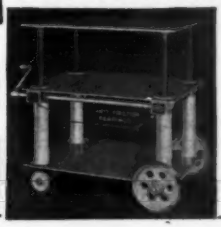


Lift Loads Automatically and Save Man Power.

Tool Stand Speeds Inspection

A new Scherr Tool Stand is designed primarily to serve as a vise or clamp for holding micrometers, snap gages and other tools.

It is generally known that if micrometers, gages, etc., are held in the hand, the heat transmitted to the frames may expand and distort them sufficiently to make extremely accurate measurements impossible. It is explained that a difference in temperature of only 10-15 degrees will expand a 2" micrometer approximately a half-thousandth, aside from distorting the measuring anvils out of parallelism.

For really serious measurements, therefore, and for setting micrometers, gages, etc. the tools should not be held in the hands but placed in a vise, isolating them from body heat.

The new stand has been developed for this purpose and is so constructed that the micrometer or snap gage may be held securely without damage to finish of the frame. The jaws are parallel, without serrations. A small piece of scotch tape on the inside will hold the tool firmly without exerting too much pressure. The jaws may be swiveled from vertical to horizontal. Base is cast iron, and jaws are of cold rolled steel.

In inspection departments where micrometers or snap gages are used for diameter or thickness checking, the stand should increase production materially.

At the left, a girl inspector is shown using a gage without stand. She holds the gage in one hand, using the other to pick up the work. The girl at the right uses the stand, freeing both hands for checking work, which results in a remarkable speed - up in gaging, increases skill and reduces fatigue, which develops more rapidly in the one-handed method.

Complete information may be obtained from George Scherr Co., 122 Lafayette St., New York, N. Y.

Cold Welding Booklet

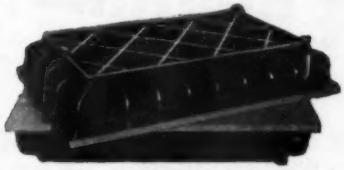
The "Frostrode" process of refrigerated welding, thru which welding electrodes are actually so cold as to be continually covered with frost, is described in a new 4-page bulletin just issued by the Frostrode Division of Weltronic Corp., 3080 E. Outer Drive, Detroit. In addition to increasing spot weld runs between tip dressing, it is said to overcome, by eliminating undesirable heat at the electrodes, many difficulties hitherto encountered in armor-plate and aluminum welding.

Reid Master Surface Plates

The Tool Engineering Service Co., 242 Washington Ave., Nutley, N. J., offers a line of Reid Master Surface Plates designed for use in laying out, inspecting, assembling, and checking work requiring extreme accuracy.

The line includes 8 sizes, from 12" wide, 18" long, 3" high, to 36x72x12¼".

These master plates are normalized and weather seasoned, planed and



scraped on the same 3-point bearing on which they will rest in use and are furnished with planed or hand scraped surface.

According to the makers, the heavily webbed underframes will prevent any distortion. All scraped plates will be furnished with a cover, all large plates will have a tapped hole at each end for a standard eye bolt to facilitate handling.

Bulletin on New Lead Checker

Describing in detail the new 1205 "Sine-Line" Gear Lead Checker recently developed by the Michigan Tool Co., 7171 E. McNichols Road, Detroit, a new bulletin is now ready for distribution. It gives information covering the "Sine-Line" method of operation, dimensions, and other data for the machine, which is capable of measuring gear leads from zero to infinity. Several views of the operating mechanism and a table of specifications are included in addition to illustrations.

The new unit is especially applicable in gear departments for inspection of gears, checking accuracy of gear generating set-ups, checking lead screws and similar parts where extreme accuracy is essential. By utilizing the "Sine-Line" method, any need for master rolls, discs, or lead screws is eliminated. The 1205 Lead Checker is suitable for use with the Michigan Gear Checking Recorder.

Reducing Machine Tool Chatter

A marked development in the use of colloidal graphite for machine tool lubrication is reported since the start of our war program. While machine tool manufacturers themselves have long used this product for initial lubrication of machine beds, ways, cross-slides, gibs, etc., to assist in reducing static friction when "breaking in" new machines, recently the practice has spread into the actual service lubrication of such equipment, according to Acheson Colloids Corp., Port Huron, Mich.

Believed to be primarily responsible for this development in industry are two causes: — Increased manufacturing accuracy generally demanded by war production and increased operating speeds, particularly in connection with the use of carbide tools.

The particular characteristic of "dag" colloidal graphite which accounts for the development is that the extremely fine particles of pure graphite are absorbed by the metal surfaces under friction, forming a "graphoid" surface.

Chatter, "stuttering," or irregular movements due to momentary failure of the lubricating film on machine beds, slides, etc., is said to be eliminated, for all practical purposes.

In addition, the lowering of the values of "static" friction (when starting a machine or starting the feed, etc.) is responsible for a not inconsiderable reduction in machine friction.

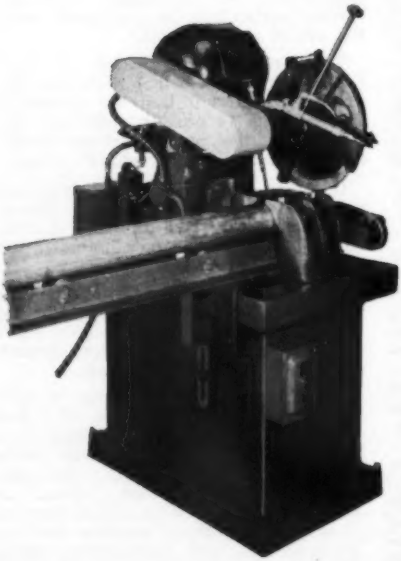
Usual method of application of colloidal graphite is in the form of a dispersion in oil which is brushed onto the ways, slides, etc., at periodic intervals (usually once a day). The colloidal graphite lubricant "oildag" is also used in addition to, rather than in place of, conventional machine tool lubricants — in some cases being added directly to the machine tool lubricant.

Apparently the extremely fine particle size of the colloidal graphite together with the absence of impurities has eliminated many of the old objections to the use of graphites for such purposes.

PINES CUT-OFF MACHINE

SERIES 500

FOR SQUARE OR ANGLE CUTTING ON TUBES, RODS OR SHAPES



It has a capacity for: Friction Cutting of low carbon steel tubes up to 5" diameter by 3/16" wall, using steel saw blades; For Milling Cutting of non-ferrous tubes up to 5" diameter by 3/8" wall; Abrasive Cutting of ferrous or non-ferrous metals up to 2½" diameter solid bars or 4" diameter tubes.

Pines Cut-Off Machine is used extensively in cutting projectile rotating bands up to 90 mm.

Machine may be wet or dry depending on job requirements. Motor circuits have overload and low voltage protection; will operate on either AC or DC current.

Hand, Foot or Automatic saw carriage operation; Chucks available in manual or air types for either hand or foot operation.

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"Let's Talk Shop!"

Modern Marking Methods

By JOHN E. HYLER

THE days that featured crude methods of marking have passed into history, and as we look about us we see evidence of it on every side. Old methods that have been retained in principle have been improved, and in addition, a number of new methods have been developed. Even in the matter of layout lines, the proposition of using blue vitriol has been laid aside by most progressive shops, in favor of commercial layout dope. I know of several firms, at least, that are offering such material for machine shop layout men.

One of the developments that has been making headway in various types of metal marking, is the electric marking tool. An interesting function of some of these tools, is that they will mark parts and demagnetize them at the same time. This is a very valuable feature when marking parts that have been held by a magnetic chuck, and that must not retain any of the magnetism they have picked up.

One firm I know builds electric markers in two different models. One of these is suitable for marking on iron, steel, or alloys of those metals, while the other will mark on all different kinds of materials, such as non-ferrous metals, glass, ceramics, etc. Another builder of electric markers makes a model having a special pencil tipped with a material they call Elkonite. And there are others who make good tools of this particular type. One of the chief uses for electric markers is that of marking on tools, for identification, to prevent loss, etc. However, I have known of cases where tools and cutters in a shop were marked permanently with some reference letter, reference number, or combination of the two. Take, as a case in point, a shop where a great number of milling machine cutters for many different jobs are kept at hand, some of the cutters being used on many different jobs. By marking the cutters with an electrical tool, and storing them in numerical sequence, it is easy to locate any tool designated by number. These numbers may then be used on job instruction sheets. For instance, the instruction sheet, following the operation sequence pre-determined on prior runs of the same job or product, may say "Straddlemill per detail, using cutters Nos. 27 and 42. Next, slit as shown, at miller, using saw No.

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Your cost figures will Show that "PRESS TIME" runs high on your larger machines—Especially when producing small parts or in frequent set-ups for light work. Do your small jobs—odd jobs—special work—on a press that is designed and built expressly to save time and money in these operations. Safety devices such as Knockout BAR, the non-repeating clutch are standard equipment on this press without extra cost.

Specifications: Model 10 H, Shown in Cut

SPECIFICATIONS	
Diameter of main bearing and pin	1¼"x3½"
Standard stroke	2"
Special stroke (at extra cost) maximum	3"
Top of bolster plate, front to back, right to left	11"x14½"
Thickness of bolster plate	1½"
Bed to slide, stroke down, adjustment up, (Standard Stroke)	*
Top of bolster plate, stroke down, adjustment up	*
Depth of throat, ram center to frame	5"
Weight of Flywheel	150 lbs.
Speed of Flywheel	200 R.P.M.
Weight complete without skids, (approximately)	975 lbs.
Pressure at bottom of stroke	15 tons
Size of hole in ram for punch shank	1-9/16"
Motor speed and horsepower required	1750—½

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6." Using such a system, there is no day-dreaming and listless hunting for elusive tools.

Hand Power Tools and Stamps

One of the best methods I have seen for making a large selection of stamping units readily accessible and easy to use, is that of mounting the stamps around the circumference of a disk, so that the disk may be turned readily to bring any required letter or number to the bottom of the disk, which is working position. A permanent pointer is installed so that the placing of the required character may be accurate, and the face of the disk, around the rim, has the letter or number adjacent to each stamp, on the same radial line, which that stamp carries, for ready selection of the correct ones to use. This is a hand-powered device, and is very speedy in operation.

Another highly useful type of machine is in the form of a light hand stamp, with an automatic rotary arrangement of multiple disks, operating on the principle of a counting mechanism, or of the machines used on printing presses for consecutive numbering. Such machines are very convenient in the marking of metal checks, name plates or other items which require consecutive numbering. It is built with a shank to be struck with a hammer, like any ordinary hand stamp.

Marks placed on products by inspectors or by machine operators are often confused as between different working shifts, because it is advisable that the same number be used, many times, to designate given portions of the work. In order to avoid confusion as between shifts, one maker of inspectors' and operators' stamps furnishes the same numbers surrounded with different borders, such as, a triangle, a square, a circle or an oval. It follows that different shifts might have an inspector carrying a stamp No. 1, and yet each

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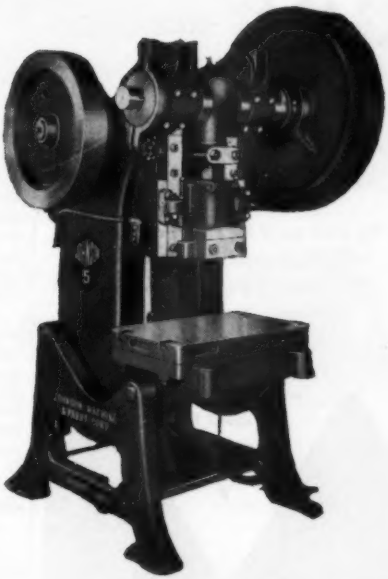

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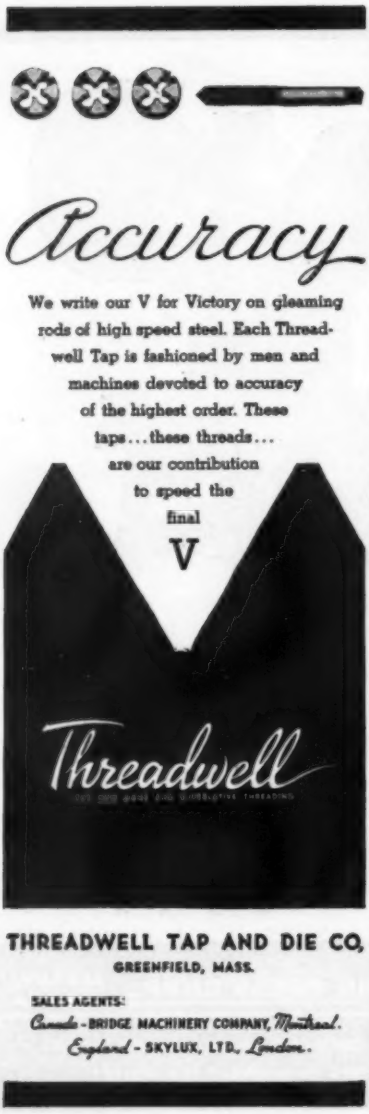
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of the four, having a different border on his stamp, might readily have his own stamp traced to him in person. It is simply a matter or noting whether the No. 1 is enclosed in a triangle, square, circle or oval.

Full Lines of Marking Machines

The importance of marking in the metal-working industries could be no more fully attested than by observing how some firms have elected to specialize in building machines and devices for the purpose. One firm in particular makes both hand and power-operated machines and devices for marking either round or flat parts or products, and makes them for practically any production capacity.

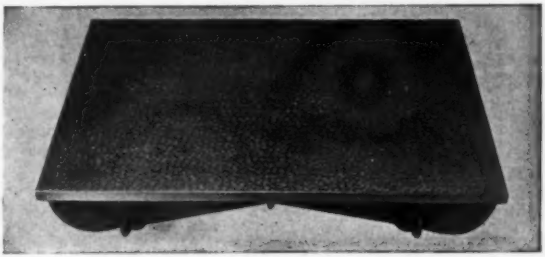
Another firm has made many special marking machines for the trade, one of which is a hand stamping press for round spark plug parts, and another a power stamping press for flat automobile name plates. The same company has also developed a production marking press for conical fuse caps. In addition, I believed this concern has a full line of standard marking machines and devices.

One company which has long built a line of excellent marking machines and equipment that imprints by the means of the rolling process, the marking die being of rotary type, and revolving and traversing the material to be marked. This is a thoroly competent working principle in marking, as is evidenced by the success and popularity of this line of machines.

Special Methods and Machines

How about taking a diamond-pointed tool and writing on metal with it? Yes, this is also a practical proposition much favored by some for special types of marking, and there are those who furnish diamond tools for this purpose.

In some cases, marking facilities have been included in the same machine which is used for other purposes also. There is, for instance, a machine built on the pantographic principle, which has three different heads that can be mounted, one of them being for rapid marking. The other two heads are for engraving and for acid-etching, respec-



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ANGLES—designed with high safety factor—exceptionally easy to handle—require less man power. Many sizes and shapes.

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tively. This is really a useful marking machine for any who can employ the other facilities mentioned.

Compressed air is a suitable medium for powering a marking machine, and some of our foremost builders use it for the purpose. Pneumatic marking machines designed for the purpose of marking part, catalog or serial numbers on metal fabrications, or for any other marking purpose within the scope of the tools, are being offered, and the builders have a very full line of marking tools and machinery.

Did you know that there are firms which go in for specials and specials only? This is the case in the marking machine field as in many others. There are concerns that are highly efficient at designing and building marking machinery, but who build a machine only to suit some special purpose. Therefore, if you have never been able to find just the marking machine or device you need, do not despair. It will and can be made for you, if you go to the right source of supply.

One might think that if compressed air is successfully used for marking machinery, as mentioned a little before, then surely hydraulic power should be adaptable. This is indeed the case, and some very wonderful hydraulic markers have been built in times past, and are no doubt still available. One of the most interesting marking machines I have ever encountered was developed for marking automotive engine valves, and it did the job at around 50 per minute. The basis of the design was a disk feed, and the feed could have been speeded beyond the point mentioned to some degree, had the operator been able to load the valves any faster.

Marking is of extreme importance in the modern plant as matters now stand, and it will certainly become no less so in days to come. To be able to identify a part quickly by means of a part number stamped upon it, or to be able to identify the machine itself thru comparison of the serial number with which it is marked and the production

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Machine tool operators give slight thought to the little center which holds the work on their lathe or grinder or milling machine ..... *until it burns out or breaks down.* But . . . . WHEN PRODUCTION STOPS . . . . it looms up BIG in importance.

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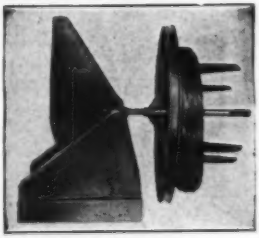

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records department, are matters of great convenience for the customer, as well as for the manufacturer. To be able to stamp a bit of instruction on some machine part where it is likely to be sorely needed, constitutes insurance that far exceeds in value, whatever cost may be involved in equipping for proper marking. These are but a few phases of the many with which modern industry must contend.

One of the prominent manufacturers of marking equipment sponsors an educational course in Marking Engineering.

EDITORIAL NOTES:—

Firms furnishing layout dope to the trade are Tamms Silica Co., 228 N. LaSalle St., Chicago, Ill., The Dykem Co., 2301 N. 11th St., St. Louis, Mo., Michigan Chrome & Chemical Co., 6350 E. Jefferson Ave., Detroit, Mich. and Dayton Rogers Mfg. Co., Minneapolis, Minn.

Makers of electric marking tool that marks and demagnetizes at the same time is the Luma Electric Equipment Co., P. O. Box 132, Toledo, Ohio.

The firm having two different electric markers, one for ferrous metals and their alloys, and the other for non-ferrous metals, glass, ceramics, etc., is the Ideal Commutator Dresser Co., 1031 Park Ave., Sycamore, Ill.

The concern having electric marker featuring a pencil with Elkonite tip, is Brewster-Squires Co., 42 Church Street, New York City.

Other builders of good electric markers are Printz Electric Co., 14595 Kentucky Ave., Detroit, Mich., Martindale Electric Co., Hird St., Cleveland, O., and Breuer Electric Co., 5118 N. Ravenswood Ave., Chicago.

Manufacturer of the hand powered stamping device having the numbers or letters arranged around the circumference of a disk, revolvable so that any desired number may be brought to the bottom, is The Acromark Corp., 913 Morrell St., Elizabeth, N. J.

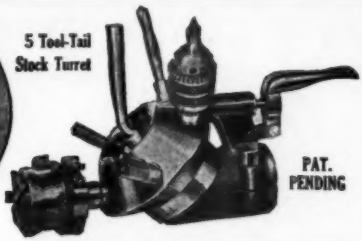
The light hand type of automatic machine stamp, made to stamp numbers automatically and consecutively with hand operation, is made by Numberall Stamp and Tool Co., Inc., Huguenot Park, Staten Island, N. Y.

Inspectors and operators stamps, capable of being differentiated by different borders as mentioned, are made by New Method Steel Stamps, Inc., 145 Jos. Campau, Detroit, Mich.

Hand and power-operated machines and devices for marking either round or flat parts are offered by Jas. H. Mathews & Co., 2535 Forbes Field, Pittsburgh, Pa.

The company which made the hand power press for spark plug parts, the power stamping press for flat auto name plates, a production marker for conical fuse caps, which has a full line of marking machines and devices, is Wm. A. Force & Co., Inc., 182 North Wacker Drive, Chicago, Ill.

DON'T WAIT
FOR TURRET LATHES



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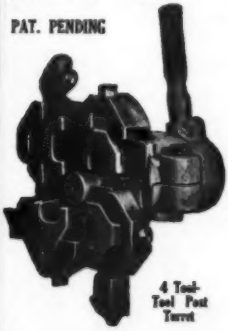

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Convert YOUR engine lathes into complete, accurate, precision turret lathes, by attaching the JEFFERSON TAIL STOCK TURRET, the JEFFERSON TOOL POST TURRET, and the JEFFERSON ADJUSTABLE PULL FEED to your lathes as shown below. The productive capacity of these machines will be more than doubled in many instances—because there will be available at all times NINE DIFFERENT TOOLS.

With these three JEFFERSON time-saving devices attached to a lathe, any kind of work may be done, such as forming, roughing, boring, finishing, knurling, drilling, tapping, etc., without stopping the lathe or changing tools. The JEFFERSON TURRETS are made very substantial, rigid, accurate and to fit small bench lathes up to lathes with 24" swing.

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The Hormel-M Grinder is sturdily built with a supporting leg under the grinding table to eliminate vibration and tipping due to pressure on belt. Ball bearing throughout, equipped with Alemite lubrication, complete with grease gun.

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The line of marking machines and devices that mark by the rolling process is made by Noble & Westbrook Mfg. Co., East Hartford, Conn.

Diamond points for writing on metal may be obtained from E. Karelson, Inc., 54-56 West 45th St., New York City and other suppliers of diamond tools.

Pantographic types of combined marking, engraving and etching machines are made by H. P. Preis Engraving Machine Co., 157A Summit St., Newark, N. J. and Geo. Gorton Machine Co., Racine, Wis.

Pneumatic marking machines as cited are made by Geo. T. Schmidt, Inc., 1802 Belle Plaine Ave., Chicago, Ill.

Marking machines are made to order, and to order only by Scovill Mfg. Co., Waterbury, Conn.

The Martin Machine Co., Inc., Turners Falls, Mass., were the builders of the hydraulic, disk feed marking machine for automotive engine valves as mentioned.

The course in Marking Engineering is sponsored by Acromark Corp., 913 Morrell St., Elizabeth, N. J.

"SPECIAL" STANDARDS

These special carbide cutting tools, and over 176 others in one plant, started out identically alike, as square end "Standard" Carboloy tools. A tool engineer with real "Yankee ingenuity" saved himself and his company weeks of time (and quite a bit of money) by ordering a supply of standard tools, which he could get on immediate delivery, and grinding them to over 200 various special shapes needed for chamfering, grooving, forming operations, etc.

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Atlas CATALOG OF WAR EQUIPMENT FOR SMALL PARTS PRODUCTION

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MILLING MACHINES

Compact, powerful bench millers have backgeared power. Available with hand operated controls, rapid production levers, or "Change-O-Matic" for instant selection of automatic feeds.

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Atlas F-series 10" backgeared, screw-cutting lathes fill every need as the basic, multi-purpose tool. Available with turret attachments.

SHAPERS

Handle all work within a 7" stroke accurately, economically, quickly. Timken-equipped crank-type bull-gear drive, automatic cross feeds, V-belt drive. Operates on ½ H.P. motor.

Multiple Spindle DRILLING MACHINES

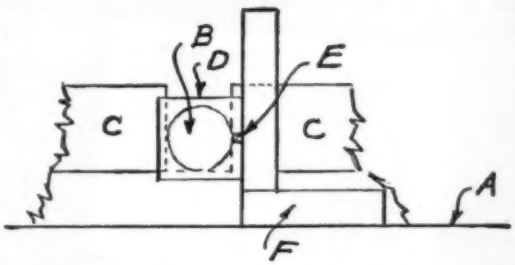
Step up production, cut costs on small-hole drilling, tapping. Massive production oil table, solid floor legs. 4-, 3-, and 2-spindle models.

Quality Shop Equipment
Since 1911

Milling Opposed Keyways or Spline Cuts

If you often come to the place where you need to mill keyways or spline cuts on three or four shafts, directly opposite to one another, only to find that all of the available dividing heads are busy, you will appreciate this little scheme. It simply consists of taking a square block of steel, boring it to the size required to fit the shafts, and drilling and tapping it to receive a hollow-head setscrew by means of which it may be rigidly attached to the shaft being milled.

In the drawing, the line A represents the surface of the milling machine table, and C and C are the jaws of a milling machine vise, holding the shaft B clamped between them. The square block mentioned is shown at D, and is drilled and tapped as at E to receive the hollow-head setscrew.



In clamping the shaft between the jaws of the vise, set a square on the table as at F, allowing it to line up the block D with one side vertical as shown, and mill the first cut. Then, loosen the jaws, turn the shaft over, and line the opposite side of the block with the square in the same position, clamp and mill the remaining cut.

This description is predicated on the

LITTELL Air-Blast Valve automatically ejects pieces from punch presses. Keeps operator's hand out of danger zone. Increases safety and speed. Air nozzle quickly adjustable.

Other Littell safety devices include Pres-Vac Safety Feeders for picking up and feeding flat-surfaced materials; also, air-operated Mechanical Pickers for feeding pieces that vacuum lift will not pick up.

Littell makes a complete line of Automatic Reels, Feeds, Straighteners, Scrap Cutters, etc. *REQUEST BULLETINS*

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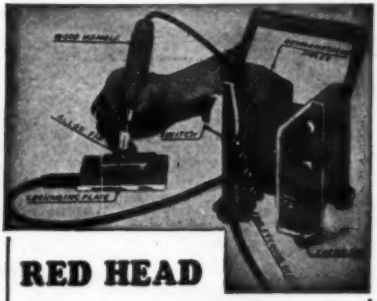
4155 RAVENSWOOD AVE CHICAGO ILL.



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Let us tell you the many advantages of our new D. C. and A. C. models now available. Also, see our new line of Midget Chucks.

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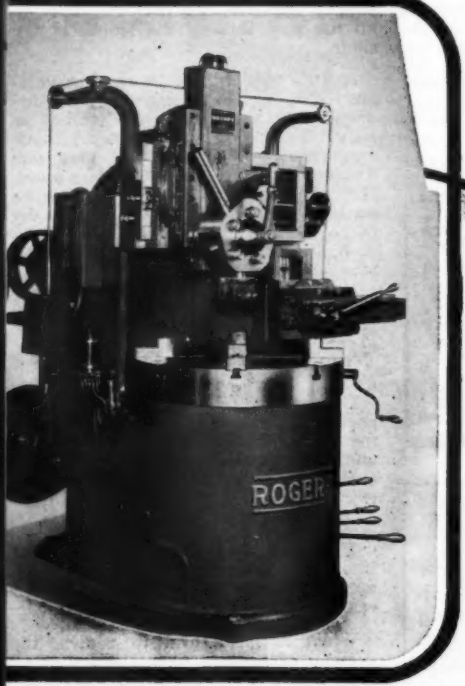
the "PERFECT 36"

36" Diameter Capacity



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"Machine it on the level with Rogers Vertical Turret Mill" is the daily command of men responsible for faster, more accurate milling, boring, turning and drilling of large ferrous and non-ferrous castings, forging and similar pieces of essential war parts.

Quicker set-ups . . . more finished work per hour per mill . . . *and closer tolerance* are the direct results of a level chuck that allows work to slide easily and quickly into exact position in a *minimum amount of operator's time and subsequent reduction of "down time."* The wide range and types of work produced by both main and side turrets will make Rogers Vertical Turret Mill as versatile in tomorrow's peace-time production as they are today in turning out a great variety of urgent war production.

Rogers specially designed swivel head can be set at any angle up to 35 degrees each side of vertical to facilitate tool setting for irregular shaped pieces.

Call on Rogers today and tomorrow to "Machine It on the Level."

Rogers are now making *surprisingly quick deliveries at attractive prices.*

FEATURES

contained compact design for icker set-ups and more accurate ished work.

stable swivel head — set at any gle up to 35 degrees each side vertical.

zontal 4-jaw chuck with 36" di-eter capacity.

ted main turret and 4-sided side et.

d power driven traverse on main ad.

type main and side head rail h saddle, swivel and tool stake.

diameter spindle with 175 sq. V-shaped bearing 14⅜" in di-eter.

operated controls.

V-belt main drive with adjust-take-up.

RPM motor drive with 7½ HP stant duty motor main drive 1½ HP motor for rapid traverse.

dard and high speed models.

Typical Rogers "PERFECT 36" Vertical Turret Mills that are speeding up production of war material such as ships, tanks, trucks, railroad equipment.

Knowing How Since 1885

ROGERS MACHINE WORKS INC.

FACTORY: ALFRED, N.Y.

OFFICES: 125 ARTHUR ST., BUFFALO, N.Y.

proposition that the cuts required will not extend the full length of the shaft, for then the block D would be in the way. But the same block may be used when shafts do have to be milled all the way thru. To do this, square the block up just as shown, and tighten the jaws of the vise. Then, remove the block D and mill all the way thru. Next, before loosening the vise jaws, replace the block, squaring it while tightening the hollow-head screw E. Then loosen the jaws of the vise, and swing the work over as before. Square up the block again, tighten the vise jaws, then remove the block and mill. Obviously, this will bring your cuts exactly opposite, tho the cuts must go all the way thruout the length of the shaft.

A little thought will show that various types of blocks may be used, incorporating various angular values as between some of their sides. A block equilaterally triangular will give you 3 cuts around a shaft, 120 degrees apart. But odd angular values may also be accurately obtained in this manner, by preparing and keeping a suitable block at hand, and on some peculiar jobs of repetitive nature, which involve only a few pieces in each lot, the expedient will be found equal to or better than bothering with a dividing head.

Numerical Conversion

By Joe Harner

Decimal equivalents for fractional parts of an inch are encountered in all mechanical and sheet metal work. Circumferences are calculated or reference is made to charts and the results are always in inches and decimal parts of an inch.

These decimals must be converted into fractions accurately in order to lay out the work correctly and this is easily accomplished by the rules given:

When it is desired to reduce the decimal of an inch to a fraction of an inch, multiply the decimal by the fraction whose denominator is wanted. Thus to reduce .01562" to 64ths, multiply the decimal by 64.

THE HANDIEST RACK YOU EVER SAW

GREATEST CAPACITY SMALLEST FLOOR SPACE

4 arms, 51" high, stacks 10,000 lbs.; 5 arms, 57" high, 12,000 lbs. flat or round stock. Pipe or tube, less weight. 3 stands for 20' lengths; 2 for 12' or shorter. Use against wall or back to back in center of room. Cost is small, value big.

Write for circular and prices.

Wm. S. Yohe Supply Co.

503 Mahoning Rd., N. E., Canton, O.

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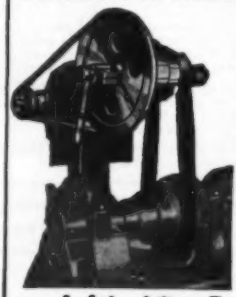
No chance of breakdown, doing a good job powering machines for defense production. No noise, floating cone, results 100% power. 8 years of production proof of durability. Easily installed.



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CUTS GRINDING COSTS

½—¾—and MORE

HEAVY DUTY

3 Phase
60 Cycle
No Brushes

GASTON POWER TOOLS

2655 W. 95th St., Evergreen Pk. Ill.

200% more production!

WALKER-TURNER *Power-Feed* DRILL PRESSES

● *This New 20" Power-Feed Drill Press* is designed for today's fast production schedules. Handling a multiple spindle model, an operator can easily turn out twice as much as on a single spindle hand-feed machine. And he won't wear himself out bearing down on a hand-feed lever all day. A bullet die maker, for example, operating a four spindle power-feed model turns out as much with one operator as four men did before on single spindle hand-feed machines. Prices, less motor, from $195. Shipment 4 to 6 weeks to war industries. ● *Send for literature.*

Walker-Turner Co., Inc.
Plainfield, New Jersey
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● *Walker-Turner 20" Drill Presses* are available in one, two, three, four and six spindle models. Free of all unnecessary gadgets and weight, they are easy to understand and operate by inexperienced help.

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FOR METAL, WOOD AND PLASTICS

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New Britain
UNIVERSAL VISE

Swivels 360 degrees horizontally, 100 degrees vertically, to give any angle or compound of angles.

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Machined Steel **DIE SETS** Semi-Steel

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Headquarters for Standardized Die Sets, embodying many exclusive features and embracing more than 195,000 stock sizes and 46 different styles. A die service that is unsurpassed. Let us prove it!

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.01562x64=.99968 64ths or 1/64th. .03125x64=2/64ths or 1/32d. Or using the fraction 32, .03125x32=1/32d.

Any fractional part of an inch may be used, for convenience, these shown on the operator's rule will be the most practical, as 1/64, 1/32. 1/16. ⅛. etc. For those wishing to use this convenient method, practice with fractions like 1/64 and 1/32. Do not make the mistake of using fractions larger than the decimal, in fact by using 64ths and 32ds, the most accurate results will be obtained.

Thus, .45312 x 64=28.999 sixtyfourths or 29/64th. If multiplied by 32, .45312x 32=14.4998 thirtyseconds. If multiplied by 16, .45312 x 16=7.2499 sixteenths, showing that the 64ths are more convenient. However, for many purposes the larger fractions are quite satisfactory.

The same rule may be applied to the decimals of a foot thru multiplying the decimal by 12.

Thus, 19.367 feet—.367x12=4.404". .404x32=12.92 thirtyseconds, or 19 foot 4 13/32 inches.

Where it is desired to convert fractions into decimals proceed thus:—

9/64ths $\frac{9 \times 100}{64}$=.14062 ⅛" $\frac{1 \times 100}{8}$=.125

15/32" $\frac{15 \times 100}{32}$=.46875 1/64" $\frac{1 \times 100}{64}$=.01562

The same method may be used for converting inches to fractions of a foot, thus:

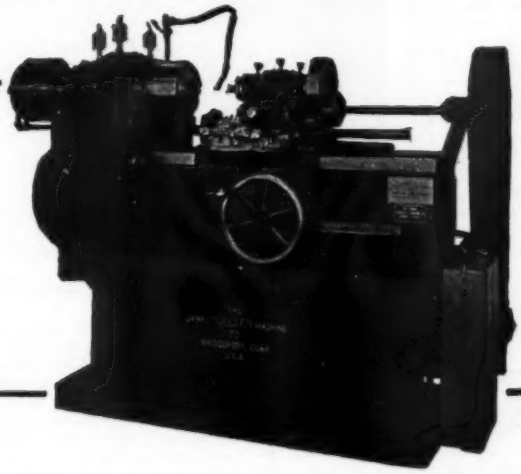
6 inches=6/12ths $\frac{6 \times 100}{12}$=.500 ft to convert back, .500x12=6".

I am a sheet metal draftsman and have used these rules for years, I can not understand why they are not in common use, as once understood they are quite indispensable.

Correction

The makers of the interchangeable dies for marking instrument dials described on page 260 of June Blue Book are the Wm. A. Force Co., 216 Nichols Av., Brooklyn, N. Y. Our apologies to readers and to the Company.

Keep Ahead of DEFENSE DEMANDS on the PRODUCTION of EXTERNAL and INTERNAL THREADS



The Coulter Type "H" Hob Thread Miller—modern in every detail of design and construction—handles high speed, accurate production of right or left hand threads. Any parts that can be held in ordinary chucks, air operated chucks, air operated collet chuck or special face plate fixture can be threaded on this machine.

Work holding spindle and cutter spindle are driven by individual motors through worm and gears. Speed changes to work spindle are accomplished by pick-off gears; cutter spindle speeds are controlled by variable motor sheave. All high speed shafts turn in anti-friction bearings.

Maximum external thread, 7"; minimum hole depends on smallest hob practical.

Send for Descriptive Bulletin giving full information.

The James **COULTER** *Machine Co.*

BRIDGEPORT • CONNECTICUT • U. S. A.

Lathes Perform Unusual Operations

High speed boring of various machine parts is being done on 10" tool room lathes at the plant of the Monarch Machine Tool Co., Sidney, Ohio. Reversing the usual lathe practice, the work is being held stationary while the tool revolves.

Instead of the regular conventional type of lathe carriage, a platen carriage which readily accepts fixtures for holding a varied class of work is provided. Shown is the boring of the swivel pin bearing hole of a taper attachment slide. The length of this slide would require a lathe of rather large capacity, representing a much higher investment and requiring a great deal more floor space than is the case with the equipment now adapted so successfully for jobs of this kind.

In adapting this particular model of tool room lathe to boring operations, it is possible to take advantage of the 100 to 1, or infinite selection, of spindle speeds available with the all-electric, adjustable-speed drive with which the lathe is equipped. The exactly correct surface cutting speed for the material and the dimension of the part being machined is readily obtained. Moreover the hand reaming which would otherwise be necessary if the job were done on a drill press is entirely eliminated.

THE MIDGET

HALF SIZE

We can supply this Indicator with or without lug on back. Also with support arm for mounting on surface gage. Light weight makes it ideal for use with magnetic base.

Waltham Dial Gage Co

STOW, MASSACHUSETTS

Physics Book

A 232 page book Physics for Engineers has just been published at $3.00 by Chemical Publishing Co., Inc., 234 King St., Brooklyn, N. Y. It is written by Sir Ambrose Fleming who has invented several types of thermionic rectifiers now in use, and has been prominently connected with the telephone, electric lighting and wireless industries.

The book explains in layman's language a summary of those phases of physics which are most necessary for the engineer. It is useful to men training for radio location and other physical work.

3 Shifts

With America rapidly entering complete total war production, many new plants are just converting to war production and others extending production to a full 24 hours.

To those entering full production for the first time, this problem of around the clock operations involves many considerations, some of which may not become readily apparent until after the new program is launched.

Careful thought and planning of every detail can help to overcome many of these problems. First, is the plant equipped with the necessary services and facilities for night operations?

Heat, steam, water and other services must be adequate to meet the increased demands. Locker room facilities must be provided. First aid and medical care must be available.

The proper diet is becoming increasingly important in the war effort, and there must be adequate provision for the proper meals. Cold meals usually will not suffice, especially on cold winter nights. If there is no provision for meals being served at night elsewhere, it may be necessary to start a company lunch room.

In addition, men and women working at night for the first time must became psychologically adjusted to a revised schedule. They will ask many questions. How am I to get to and from the plant at odd hours of the night with such poor transportation? Do I get extra pay for night shift work? Will I have as much chance for promotion? What happens to me when night shift work is dropped? These questions must be answered satisfactorily.

There are also other problems such as that of hiring additional labor, proper supervision, rotation of shifts, and workers' sleeping during daytime

APPROVED *by and* SPECIFIED *for all* MECHANIZED UNITS

We realize, as does all America, that the mechanized units of our air, land, sea and industrial forces must be dependably maintained to their exceptionally close original tolerances and standards of efficiency to insure Victory. Gits Oil and Grease Seals are providing a major essential to this cause—that of positive bearing protection under all conditions, and in the future, Gits will continue to foster new lubricating developments.

GITS BROS. MFG. CO.

1860 South Kilbourn Avenue • Chicago, Illinois

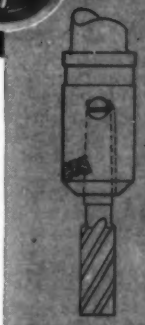
30 years of oil cup experience

THESE HIGH PRODUCTION TOOLS OFFER THE POSSIBILITY OF INCREASING YOUR PRODUCTION

Midwest End Mills are made with a high helix angle (fast spiral) to provide maximum speed in action, and with plenty of chip room to prevent clogging of chips in the flutes.

The Midwest Taper and Pin Drive tool holder has a round pin partially imbedded in the wall. A corresponding keyway in the tapered shank of the end mill fits this pin. As a result full driving energy is exerted along the entire length of the end mill shank. A safety lock screw holds the shank firmly in place. The drive is positive, rigid and always perfectly aligned.

These features in Midwest Pin Drive End Mills permit higher speeds and feeds; they result in greater production, more accurate work and exceptionally high finishes in milling operations.



ASSEMBLY VIEW
showing Midwest Pin Drive
with safety lock screw

MIDWEST

Precision METAL CUTTING TOOLS

END MILLS • SLEEVES
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SPECIAL TOOLS • DRILLS
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CARBIDE TIPPED TOOLS
ADJUSTABLE HOLDERS

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"Tooling Up" for

Wickman Optical Form Grinder

A NEW form grinder, incorporating some unique features for a machine of this type, is introduced by the Wickman Corp., 15533 Woodrow Wilson Ave., Detroit, Mich. Known as the Wickman Optical Form Grinder, it is manufactured by the Sheffield Corp., Dayton, Ohio, and is sold and serviced by the Wickman organization.

It is designed to finish grind to a very high degree of accuracy any flat or circular form tools, punches and dies, profile gages, templates and many other regularly or irregularly shaped parts. It is particularly adaptable to the grinding of tungsten carbide but is equally useful on hard tool steels.

Actually, the machine comprises a full universal tool grinder with a pantograph controlled optical checking instrument. The grinding head carries a wheel slide which moves up and down at 80 strokes a minute across contour of part to be ground. Work is clamped to the table and its position controlled and set by compound slides.

Preliminary to the grinding operation, a 50:1 layout is prepared in the drafting room on any paper of non-deforming quality. It is fastened to layout plat located above the machine. This plat is adjustable and may be locked so that its position will be unchanged while grinding is in progress. In conjunction with the layout plat is 50:1 pantograph. A 30-power microscope is carried on the short arm. Long arm of the pantograph carries a pointer which the operator moves from point to point along the line of the layout. The microscope is arranged with rotating cross hairs, the intersection of which corresponds to position of pointer on the long pantograph arm. As the operator moves pantograph pointer, intersection of the cross hairs moves correspondingly at the 50:1 reduction.

The wheel head assembly can be adjusted to any desired position or angle by 3 radial slides, and its path across contour of work is manually determined by lateral and longitudinal cross slides.

Grinding wheel is fed to the point established by intersection of the cross hairs, and its exact position is observed thru microscope. As work is being

viewed and inspected directly in the operating plane, wheel is always fed up to the determined point on work. Accuracy of the grinding operation, is therefore, not affected by wheel wear.

The 2" stroke of the wheel permits a number of thin pieces to be stacked together. This feature is particularly valuable when producing small quantities of precision parts which must be identical. The machine will grind a form 5¾" in length and 2⅜" in depth in parts 2" thick. The layout size is 20" square which permits grinding an area .400"x.400" in one setting. Profiles greater than .400" square in area can also be handled by special methods.

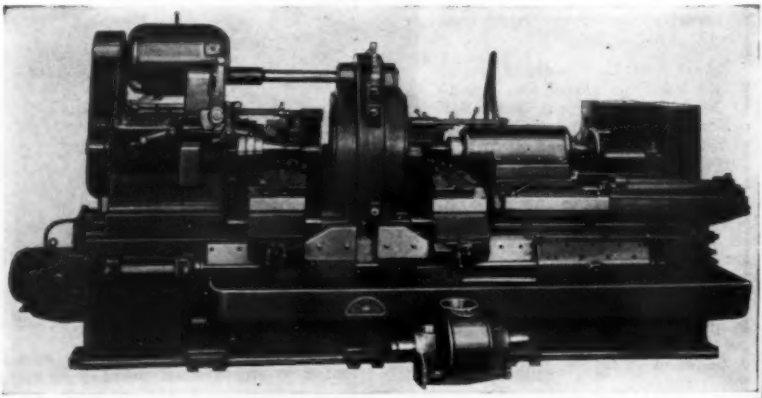
By use of the same equipment, but reversing the procedure, it is possible to inspect part without removing from machine. It is also possible to record or transfer contours of a part on a drawing 50 times its size, thus producing an accurate layout of any form for which no detail drawing is available.

All necessary equipment for grinding flat work—including electrical equipment for regular a-c current—is furnished as standard. A wheel dresser capable of dressing straight faces to any required angle is also provided as standard equipment. However, this is used only when straight lines are being ground on the work. All irregular forms are ground with wheel dressed by hand.

Machine is provided with upper and lower lights to illuminate work. To prevent grit and dust from getting into parts of the machine, a completely filtered exhaust system is built into base. It may be removed and washed at any time. A separate motor-driven circular grinding attachment is available as an extra for use on cylindrical work such as circular form tools. The machine is operated in the same manner as for flat work, except that the reciprocating motion of the wheel is not used.

The entire machine, including layout plat, occupies a floor area 61¼x45¼".

A Snyder, Heavy-Duty Hydraulic Turning Machine



A production increase of 65% is claimed on a certain job for this heavy-duty, double-end hydraulic machine, built by Snyder Tool and Engineering Co., Detroit.

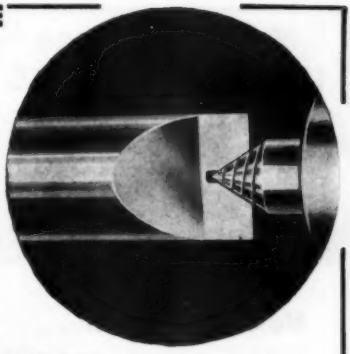
The original operation contemplated one heavy and one light cut but actual conditions necessitated 2 heavy cuts and the removal of up to 6 times the amount of stock originally contemplated. In spite of this, however, and the fact that both front and rear tool blocks are manually adjusted between

CMD -- HELICAL GROOVE

LATHE CENTER

When used with CMD Lathe Center Point Lubricants has an operating Ratio of from 15 to 1 running time over the conventional TYPE OF LATHE CENTER

CMD Helical groove center expels heat from work caused by cutting tools — conveys center lubricant to extreme point of work and center — Lubricates entire bearing surface of work and center — No stopping of lathe to relubricate the center — No readjustment of tail stock necessary — No dripping or crushing out lubricant — Frictional heats reduced — Expansion of work kept at a minimum.



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CERROMATRIX (Melting Temp., 250° F.) For securing punch and die parts, anchoring machine parts without expensive drive fits, for engraving machine models, stripper plates, chucks, short run forming dies and other metal-working applications.

CERROBEND (Melting Temp., 158° F.) Used as a filler in bending thin-walled tubing to small radii. Easily removed in boiling water. Also used for aircraft assembly jigs, templates for forming dies and other purposes.

These two low-temperature-melting and expanding alloys are helping to speed up production of war materials for the Army, Navy and Air Force.

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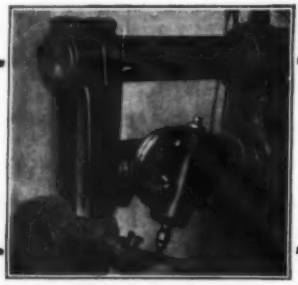
CERRO DE PASCO COPPER CORPORATION

40 WALL STREET . . . . . NEW YORK, N. Y.

Make all these INTRICATE CUTS

. . . on Any Miller New or Old with . . .



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Milling Machine Attachments

Now — in just 3 minutes time — you can convert your old standard millers into a highly adaptable, high-production miller that will

1—mill compound angles
2—spot face on a bevel
3—sink a horizontal keyway
4—mill a T-slot
5—contour radii or angles
6—cut an internal or external cam

And it does scores of other operations required on dies, fixtures, templates and metal patterns. Unequalled for experimental tool room or production work. One man handles it easily. Reasonably prompt deliveries. Write for types, sizes, speeds and prices.

PORTER - CABLE MACHINE CO.
300-7 Exchange St., Syracuse, N. Y.
Precision Tool Builders Since 1906

the first and second cuts, production is 65% more than estimated.

An interesting feature is the hydraulic feed operated from a single hydraulic power unit in rear of machine. This unit furnishes power to both front and rear tool slides as well as to tailstock. Movement of tailstock is controlled by a hand operated valve and facilitates loading and unloading of piece by pushing it forward into center drive fixture.

Right hand tool bracket, when swung into clearance position, provides a loading platform in line with locating surface in center drive.

When part is loaded and pushed into place between centers, it is clamped manually and tailstock locked in place, ready for the first of the 2 turning operations.

A further function of the hydraulic system is actuating of front and rear tool slides. A single cylinder is used to cam the two front slides into position, at which point the cams stop moving and tool slides are traveled thru their work cycle.

Each front tool slide has its own hydraulic cylinder and the slides are racked together to permit a single hydraulic and electrical control. Likewise, the rear tool slides are kept synchronized by a pair of hydraulically actuated cam plates which move slides thru a rapid advance and feed cycle.

Control for the entire machine comprises a start and stop push button, a cycle start push button and an emergency return, these being mounted on center drive, right in front of operator. Machine is equipped thruout with antifriction bearings, headstock, which uses a twin-plate friction clutch between motor drive and spindle, being equipped with an oil pump for pressure lubricating. Center drive is carried on a pair of extra large Timken bearings and is equipped with an oil reservoir from which oil is carried to bearings and gears by means of the main gear in the drive.

Base is of welded steel construction, well ribbed for rigidity and machine itself is constructed with very heavy cross sections in all vital parts.

A CLAMP for Every Purpose

Forged Steel
Quick Acting
Deep Reach
Welders

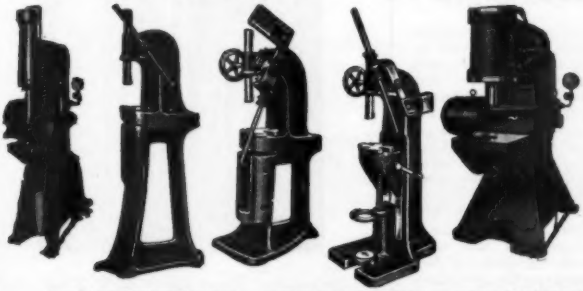
Sizes Available:
¾" to 10' opening
½" to 16" deep

Write for CATALOG and PRICES on Clamps for all purposes as well as many other tools for use in the Machine Shop.

IN STOCK AT YOUR SUPPLY HOUSE

The Cincinnati Tool Co., 1945 WAVERLY AVE., CINCINNATI, OHIO

For AIRCRAFT and MUNITIONS



1883
GREENERD
The Originators of the Arbor Press
1941

PRECISION WORK IN REARMAMENT

65 Standard Styles and Sizes. Manually operated presses ¼ to 35 tons pressure. Motor driven hydraulic presses 1½ to 30 tons pressure.

Let us send you our catalog No. F.

GREENERD ARBOR PRESSES

NASHUA Est. 1883 NEW HAMPSHIRE

NEW FOOT OPERATED
AUTOMATIC VISE
SPEEDS UP PRODUCTION

FASTER OPERATING—
JAW ADJUSTMENT

Permits of free use of both hands in setting up and removing work. Clamps and releases entirely by foot. Has permanent holding pressure 6000 lbs. per sq. inch! Sensitive touch—ideal for women operators—can be mounted flush with bench or extended. Vise locks automatically. Instant release with either foot regardless of pressure. Movable jaw always under control. Vital parts made of steel—working parts are case hardened—Jaw 4½", open 6¼". Quick, easy installation. Saves time and labor. Speeds up filing, pressing and cutting operations, and ordinary vise work. Has wide use on production lines, in tool rooms, and for maintenance. Can be mounted on portable stand. Sold on money-back guarantee.

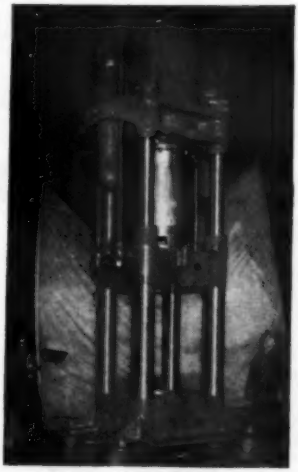
Write for literature.

AUTOMATIC VISE
SALES COMPANY
2845 Sunset Place, Los Angeles, Calif.

The base functions as a large chip trough and coolant container, chips being removed from rear. Coolant is circulated to cutting tools by a motorized pump. Fine chips in coolant are removed by screening and passing the liquid over a series of baffles to precipitate fragments.

Baldwin Piercing Press

A new 500-ton piercing press has been produced by Baldwin Southwark Division of The Baldwin Locomotive Works, Philadelphia, for the country's principal shell forging plants. The main ram of this press has a diameter of 32", a stroke of 42". The press has a working pressure of 1,500 lbs. The distance between platens is 99" and the stripper cylinder in the bottom platen has a diameter of 12".



Requiring floor space of 7' 2"x6', the overall height of the press is 25', 3½". The press is complete with operating valves and piping and is of all cast steel construction. All rams are of hard cast iron, and all cylinder guides and column guides are bronze bushed. Press columns are especially sturdy to withstand the heavy service of 240 strokes per hour on a 24-hour day operation.

Tin

Tin comes next to aluminum in respect to quantities of critical metals consumed for structural use by G-E Co. Its 3 main uses divide into tin-base bronzes, babbitts, and solders.

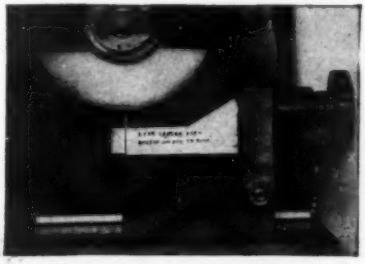
The composition used in the G-E standard babbitt for rotating apparatus bearings over a period of years is one containing 83 1/3% tin. However, as a result of the tin conservation order M-43-a of Dec. 31, 1941, a lead-base babbitt containing 8 2 ½ % lead, 15% antimony, 1% arsenic, 1% tin, 0.5% copper has been developed as a satisfactory alternate for use in centrifugally cast sleeve bearings.

On that basis, the manufacture of this type of bearing in the various motor departments has been changed over in part, and is in the process of change-over for the remainder, to the use of this lead-base alloy. The resultant saving of tin may conservatively be estimated to be 200,000 pounds of tin per year at the present rate of production.

Stationary-cast bearings (cast-iron shells with dovetail anchorage) involve a problem of proper pre-tinning for the use of this same babbitt composition. Active work on this problem and some trial production are now in progress.

For larger bearings as required for power-plant turbines and generators, the conservation effort centers around a redesign to use much less material by changing to thin-wall, bonded bearings in contrast to the cast-iron anchorage type.

New C-66 RADIUS DRESSER for SURFACE GRINDERS



C-66 Radius Dresser forming female radius.

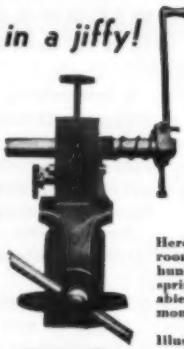
A low-priced, rugged attachment for any make of surface grinder. Mounts directly on magnetic chuck. Dresses wheel without dismantling machine—a one hour job in 10 minutes.

The C-66 will accurately dress wheels to both male and female radii. Operation is open and easy to see. For dressing wheels for grinding turning tools, the dresser is set at angle equal to clearance angle of tools. The C-66 is the only radius dresser with this feature.

Prompt delivery from factory in Newark. Sold on 10-day Free Trial. Price, without diamond, $72.50. ¼K diamond, $5.00.

SCHULTZ & ANDERSON CO.
109A Edison Place, Newark, N. J.

MAKE SPRINGS *in a jiffy!* *with* **Blaner Universal Hand SPRING WINDER**



Here's a profitable tool room unit. Quickly makes hundreds of sizes of springs. Sturdy, dependable . . . a real time and money-saver.

Illustrated is No. 4 Universal with adjusting shaft of 5/8" square. Takes wire up to 1/4" diam.

Patent No. 2052443

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THE JOHN BLANER CO.
Corner Meek & Elm, Sharon, Pa.

—GEARS—

Spur—Helical—Worm—Bevel—Miter, Etc.

We do broaching and all kinds of grinding.

We specialize in grinding hardened steel bushings, cam rollers, etc.

Prompt service and quality has retained a large list of customers for 25 years.

TAYLOR MACHINE CO.
1919 E. 61st St., Cleveland, Ohio

Progressive Seam Welders

A complete line of Seam Welders, in 3 capacity ranges and 126 models is announced by Progressive Welder Co., 3050 E. Outer Drive, Detroit.

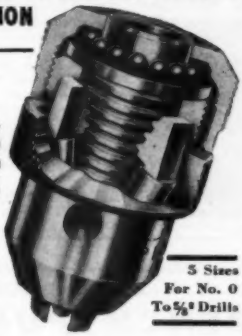
In each of the series, several standard throat depths are available, while each type is available in 6 different standard drives, 3 for circular and 3 for straight seam welding. The Universal model which may be used for both straight and circular welding is also available in 3 drive types and in each of the 3 capacity ranges.

These welders are designed for either interrupted or continuous seam-welding. Operating pressure in the new seam welders is obtained thru a double-acting adjustable-stroke air cylinder mounted directly on head support of machine. A double-action, solenoid-operated valve is used to control air pressure on the pressure (top) side of piston as well as for introduction of air at line pressure on lower side of piston for rapid return of head. A speed control valve is supplied in the air lines to both intake and exhaust sides of cylinder to reduce shock. The solenoid valve is operated thru a two-stage foot switch.

END THIS NON-PRODUCTIVE OPERATION

USE *Ettco-Emrick*

KEYLESS DRILL CHUCKS



Tightening drill chucks with keys is a non-productive operation—and uses up more time and energy in a day's drilling than you probably realize. Ettco-Emrick **KEYLESS** Drill Chucks eliminate this operation and speed up drilling. What's more, Ettco-Emrick Drill Chucks never say "uncle." Their top-notch quality and rugged construction assure trouble-free service all day and every day. Also stocked to fit all makes of portable drills.

5 Sizes
For No. 0
To 5/8" Drills

Bulletin No. 6 gives full details of the design and construction that makes drilling action do the tightening. Also includes prices. Write for a copy—today.

ETTCO TOOL CO., Inc.
596 Johnson Ave., Brooklyn, N. Y.
Detroit, ● Chicago

MAKERS OF *Ettco-Emrick* DRILL CHUCKS • TAP CHUCKS • TAPPING ATTACHMENTS
MULTIPLE TAPPING AND DRILLING HEADS • TAPPING MACHINES

TOP RIM STACKING BOXES

Systematic Storage Saves Production Time

Convenient, sturdy all-welded boxes which make stock easily and quickly available.

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FOUR SIZES
18x12x6
16 GA.
$1.27

Prompt shipment on Priority Orders —May we quote?

STERLING
FACTORY EQUIPMENT CO.

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THE PRECISION UNIVERSAL TOOL HEAD

brings all adjustments under absolute micrometric control of the operator without stopping tool or machine. In Jig Borer, Milling Machine or Horizontal Boring Mill, it bores, faces, counterbores, turns outside diameters, mills flat surfaces and slots, under-cuts, recesses, back-faces and does an almost limitless range of "headache" jobs. Send for bulletins. Address all communications, inquiries and orders to

THE PRECISION TOOL COMPANY
P. O. BOX 155, BROOKLYN, NEW YORK
Cable Address: "Pretool-New York" Tel: MAin 4-1064

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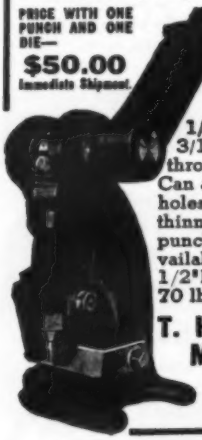
BENCH PUNCH

Built for hard, tough work — die cannot lose alignment with punch — all parts interchangeable.

PRICE WITH ONE PUNCH AND ONE DIE—
$50.00
Immediate Shipment



Capacity — 1/2" holes through 3/16" steel; 13/32" through 1/4" steel. Can also be made for holes up to 7/8" in thinner metal. Stock punches and dies available from 1/16 to 1/2" by 64ths. Weight, 70 lbs.

T. H. Lewthwaite Machine Co.
(Est. 1890)
311 E. 47th St., NEW YORK

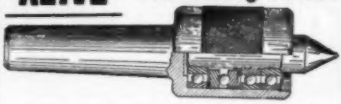
Welding heads are designed with full adjustment for wear. A special non-ferrous alloy is used to line the cast bearing housing, which is also internally water-cooled. The shaft which this bearing supports may also be water-cooled if desired.

The solid lower arms are externally water-cooled. Adjustment of stroke is provided by means of a hand-wheel controlling position of a dummy piston in machine head.

The gear train which drives the straight-seam welders incorporates an idler to compensate automatically for head position. The machines are designed for use of standard RWMA welding wheels, and are externally water-cooled.

Transformers, available to supply voltages of 220, 440 or 550, are all of the heavy duty type with shell type cores and pancake coils. Standard model seam-welders are designed for 50-60 cycle supply, while special modifications make them adaptable for use with other frequencies.

"ALIVE" Ball Bearing Centers



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Write TODAY — and let us tell you more about them.
MODERN MACHINE CORP.
323 Berry St., Brooklyn, N. Y.

KUTMORE HIGH SPEED ADJUSTABLE HOLLOW MILLS

16 standard sizes—Cutting capacities 1/32" to 2". Also specials made to order.

The KUTMORE is the only hollow mill with built-in micrometer dial adjustment. Prompt delivery —even on specials. *Write for Catalog No. 15.*

CARL WIRTH & SON, 1625 Clinton Ave., N, Rochester, N. Y.

Plants for Sub Contract Work

HERE are additional plants with machine tool capacity available for subcontract work. Code numbers are used in lieu of names for obvious reasons. Addresses are at all times available for Goverment Officials, prime contractors and responsible manufacturers.

Address all communications to Subcontract Dept., Hitchcock Publishing Co., 508 S. Dearborn St., Chicago, Ill. (Phone HARrison 6040).

If you have any idle tools in your plant, send a description of your plant and list of tools for listing. It is a patriotic duty for every plant to respond to Donald Nelson's appeal for additional subcontract capacity. There are no charges or obligations involved in connection with listing your subcontract facilities in The BLUE BOOK. It is our gratuitous contribution to help speed the American All-Out Victory Program:

H-39—Kansas producer of radial aircraft engines is anxious to convert fully to war production. At present producing ammunition tools and doing glider work. Partial list of machines available includes:—cylinder hone machine; automatic piston machine; Heald cylinder grinder; cylinder fin machine; LeBlond No. 1 Multicut; LeBlond profiling machine; LeBlond engine lathe. Complete listing available for prime contractor.

H-38—Small Ohio job shop offers 120 hours' capacity per week on 14"x6' lathe; 10"x3' lathe; pedestal drill press, 1" capacity. Recently finished order for milling machine arbors for an armament corporation and accustomed to doing accurate work.

H-37—Massachusetts manufacturer of machinery has own gray iron foundry and nonferrous foundry adjacent—also the following tool equipment:—W & S horizontal boring machine, table to bar 20" maximum; Bausch vertical boring machine, 52" capacity, 2 heads 4' high; 3' radial drill; 2 Blaisdell drills 24" spindle to column; Prentice 18" and NBP drill 20" spindle to column; 2 Flather 30 and 36" spur gear cutters and Brown & Sharpe 36"; 2 and 3 spindle bench drills; Bath universal grinders; 20 and 24" table; Boye & Emmes lathe 18"x10'; Draper 24"x 10'; Blaisdell 20"x10'; South Bend 24"x10'; Flather 20" x 8'; Draper 16" x 10'; American 20" x 8'; Prentice 18" x 10'; Pond 26"x 20'; Flather 28"x20'; Draper with Hisey-Wolf grinding attachment 14"x20'; Shaft straightening lathe and 2 hydraulic presses; Kearney & Trecker No. 1 plain miller with vertical attachment; Cincinnati No. 2 ditto; Keyway miller with 12x12"x8' table; Flather planer, 48" between uprights, 10' platen 2 heads; Pond planer, 60" between uprights. 16' platen, 2 heads; Flather planer, 36" between uprights, 14' platen, 2 heads; American planer, 30" between uprights, 8' platen, 1 head; Defiance 50-ton upright power press; Smith & Mills 20", Steptoe 16" and Lodge & Davis 16" shaper; 30" American and 24" Gisholt turret lathes; Jones & Lamson 3x36" cast iron and 2-2"x24" steel turret lathes.

H-36—Rhode Island engineering firm specializing on tools, dies, jigs, gages and special equipment has considerable capacity available for lathe, shaper, milling machine and grinder work.

H-35—Michigan manufacturer of brass cocks offers 10,000 lbs daily brass foundry capacity; 20 Warner & Swasey hand screw machines; 4 New Britain automatic chuckers; 20 drill presses; miscellaneous special and assembling machines.

H-34—Manufacturer of precision equipment in New York City has Eberhardt 16" shaper; Reed quick change 14" swing x 48" lathe; Myers semi-quick change lathe 10" swing x 20" b.c. lathe; South Bend 9" swing x 20" b.c. lathe; Garvin 21 milling machine; transmission drill press ½"; NBP heavy duty drill press; Rowells tool grinder; 2 assembly benches and miscellaneous small precision tools. Adding additional equipment.

H-33—Small shop in Northern Ohio has 14"x8' lathe; 16" Ohio shaper; Delta 14" metal cutting saw; Atlas floor type drill press; tool grinder and miscellaneous small tools available.

H-32—New York City firm has been doing subcontract work but has additional capacity. Floor space 12,000 sf exclusive of warehouse. Personnel:—4 toolmakers; 4 expert mechanics; 8 lathe operators and all-around men; 6 turret operators; 6 bench men; 2 helpers; 25 female assemblers accustomed to light dexterous work. Equipment includes:—Prentice geared heavy duty lathe 18"x8'; Monarch quick change lathe 15"x6'; 2 Seneca Falls loose change gear lathes. 12"x5' with metric thread conversion attachments; 3 Logan precision lathes 10"x3' (new); South Bend loose change gear lathe 14"x6'; (all lathes fitted with turret tailstock attachments and 4-way tool posts, also draw-in chucks and collets); 2 Morey 2G turret lathes (new) 1" bar feed and collet capacity; LeBlond plain milling machine; US Tool No. 1 production

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HIGH SPEED STEEL

Cut Thread

IMMEDIATE DELIVERY

Sizes in stock

High Speed Plug Taps

6-32 Machine Screw Taps
8-32 Machine Screw Taps
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12-24 Machine Screw Taps
1/4-20 Hand Taps
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7/16-14 Hand Taps
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1/2-13 Spiral Point Taps
1/2-20 Spiral Point Taps
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3/4-10 Spiral Point Taps

(Standard Catalog List Prices and Standard Discounts in Effect ....)

WESTERN TOOL CO.

619 W. Randolph St. - Chicago, Ill.

miller with vertical attachment; Potter & Johnson 24" heavy duty shaper; Kelly 16" shaper; Warner light power forming and stamping press, 6x60" die size, open end housing; foot press 3½" discharge opening, 8x10" die seat; B&S surface grinder, 6½x20" with magnetic chuck; Canedy-Otto heavy duty back geared drill press, to center 21" circle; 2 Canedy-Otto sensitive drill presses to center 14" circle; 4 Delta sensitive drill presses; Rearwin profile filing and sawing machine; Flyball broaching and arbor press; Racine heavy duty hacksaw 6x6"; 6x24" cylindrical grinder (for early delivery) 2 tool post grinders and the usual bench equipment, gages, testing instruments, heat treating, light welding and paint spraying equipment.

H-31—Midwestern firm, specialists in sheet metal finishing, has d-c plating generators, 6 volt, 45,000 amp. capacity; 14 sheet buffing machines; 11 coil buffing machines; square shears 2—8' 16 ga. and 4' 16 ga.; 3 rotary shears No. 1 Waterbury Farrell and 16 ga. 24"; 4 Weisbecker grinders for engravers' plates; combination sheet and coil lacquering machine; 2 crimping machines—3/16" crimp 50" face rolls and 7/16" crimp 38" face rolls; Nickel solutions, approximately 14,000 gallons; copper solutions (cyanide) approximately 5500 gallons; brass plating solutions (cyanide) approximately 2500 gallons; Hallden 26" leveler and automatic shear; scoring machine.

H-30—Sheet metal specialists in Cincinnati area offer the following equipment for subcontracting work; —7—20" and 1—30" bar folder for 24 ga. and lighter; 6' and 8' steel brakes for 20 ga. and lighter; 3 power folding machines, 30" to 6' for 24 ga. and lighter; 4 paint coating machines; 6—36", 1—42" and 1—30" Niagara square shears (foot power) and 1—5' Niagara electric power; Robertson, Federal and 2—Toledo punch presses, 10x12", 16x32", 15x23" and 28x48"; 2 gang punches; 5 embossing presses; circle shear (Quickwork 48" circle, 18 ga.); cleaning machine; 2 rotary slitters; 6 ovens; 2 riveting machines; 2 stitching machines; Sidney cutoff, straight line cut-off and rip saws; Stone planer; 3 paint making mills and 2 mixers; 4 lithograph presses; 2 gum presses and complete screen process dept.

K-13—Chicago plant making filtering equipment for beverage field. 35 years' old. Excellent financial standing. Open shop. Owns 2-story building. Has a variety of equipment:—1-48" Bridgeport vertical boring mill; 4 engine lathes from 18 to 24" swing; 1 No. 2 Brown & Sharpe Milling machine; 1 Shaper; 3 Fox lathes; 4 drill presses, etc. Highly reliable and boasts of fairly close tolerances.

K-12—Illinois plant known nationally in making of large refrigeration compressor units. Commercial tolerances only. Would like something to include fabricating. Ample space—5 engine lathes from 18 to 24" swing; 2 radial drills; 1-24" wide planer; 1 shaper; 1 Lucas horizontal boring bar, 2½"; 2 drill presses; 1 milling machine; a large assortment of secondary equipment such as power saws, pipe threaders, bending machines, both oxy and arc welders, etc.

K-11—Better than average Illinois plant long known in baker machinery field. 2 Vertical boring mills (60 and 42" tables); 13 engine lathes from 16 to 30" swing; 3 radial drills; 2 planers (30 and 36" width); 2 surface grinders; 2 shapers; 3 milling machines; group miscellaneous equipment for auxiliary work. Good management and eager for more work as present line is seriously curtailed.

K-10—Small Illinois plant doing medium close work. 2-21" Gisholt turret lathes; 1-20 and 1-24" swing engine lathes; 2 No. 2 horizontal millers; 5 drill presses, etc. Good work is a characteristic of this set-up. In small town.

K-9—Illinois manufacturer well known in railway supply field. Excellent assembly facilities. 4 engine lathes from 14" to 18" swing; 4 hand screw machines; 6 millers; 1 radial drill, 3½'; 12 drill presses; one shaper, 2 bench lathes and miscellaneous other equipment. Anxious for considerable subcontract work.

K-8—A Chicago manufacturer, long makers of machinery for construction trades, has excellent plant with good machine facilities for a lot of subcontract work. 7 engine lathes from 14" to 48" swing; 2 turret lathes of 21" swing; 2 millers; 5 shapers; 2 boring mills (42" vertical table and 2½" bar horizontal), 5 grinders including external and internal. Good management.

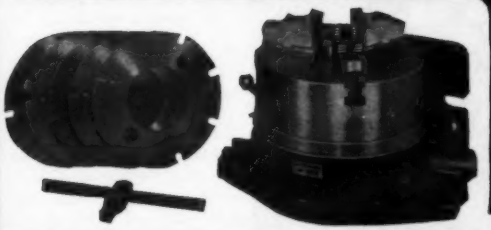
H-27—Nebraska manufacturer of pumps, cylinders, jacks, windmills, etc., offers the following equipment;—2A and No. 4 W & S turret lathes, the latter with P & W bore and air chuck equipment; 24" x 84" Reed engine lathe; 16"x48" R-M-C engine lathe; Farwell No. 2 gear hobber, 18" gear capacity, 5-6-8 pitch hobs; Colburn No. 2 2-spindle drill press 1½" drill cap. 20" table 18" chuck to table; 26" Barnes drill press 1½" cap. 36" table chuck; 21" Barnes drill press, 2" cap 36" table chuck; 24x24x60" planer; No. 3 American Can punch press 2½" stroke 6" throat; No. 3 Consolidated press 2" stroke 6" throat; No. 2 American Can presses (2) 2" stroke 6" throat; Kutscheid square shear 54" 18 gauge; Landis single head bolt cutter 1"; 16" swing cutoff saw; 16" rip saw; 36" band saw 8" capacity; 24" Fay planer, 6" cap. 16" jointer; Armstrong-Blum 6x6" hack saw; Punch and shear, 1" hole ¼" steel—½x4" shearing cap; Sheet metal roll, 38"x18 ga.; Brass furnace, oil burning 1000 lbs. cap. per 8-hr. day; 30" Whiting cupola, capacity 5 tons.

HH-106—Subcontractors wanted for high priority work which should last for the duration. Tolerances are reasonable. Facilities required; — large Gridley or New Britain chucking automatics; medium and large hand screw machines; broaching machines; thread milling eqiupment.

HH-105—Desire to contact plant equipped with lathes, shapers, milling machines, grinders, boring mills, etc., for the manufacture of surface grinders.

The HARTFORD Super Spacer

The Super Spacer with its attachments and fixtures, has proven to be a tool of exceptional value for the rigid control of accurate machining operations. It is adaptable for milling, drilling, grinding, jig boring and slotting, at feeds and speeds limited only by the capacity of the holding means and the power of the machine.



WRITE FOR DETAILED INFORMATION

THE HARTFORD SPECIAL MACHINERY CO.
HARTFORD — CONN.

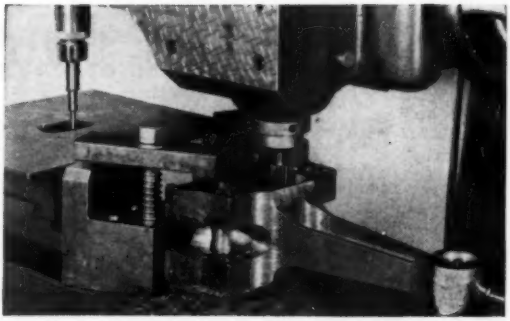
Semi-Automatic Milling Control

A SEMI-AUTOMATIC control for machine tools that permits contour machining with standard machine tools at speeds and accuracies considerable beyond the capacity of a human operation, controls the milling of aircraft connecting rods at one of the major aircraft war production plants. The equipment, known as the "Duplimatic" and manufactured by Detroit Universal Duplicator Co., 253 St. Aubin Ave., Detroit, controls both the transverse and longitudinal feeds of a Reed-Prentice vertical milling machine in much the same manner as would an operator using manual control alone. Manipulation of feed screws by the duplimatic control is in accordance with outline of a template mounted on the table with the work. Thus, the cutting tool mills along a path identical with the template in the same manner if it were controlled by an operator—except at greater speeds and closer accuracies.

The work as shown mounted on table, has a template fastened beside it. A tracer mechanism is mounted on head of mill and remains immovable as does the cutting tool. This tracer is connected with the Duplimatic control so that during the operation, the table is moved (and, of course, the work and template), so that template is always touching the tracer finger with a predetermined and exact amount of pressure.

The sensitivity of this touch is said to be so exact that the instant the movement begins to reduce or increase pressure between template and tracer finger, the Duplimatic instantly reverses the travel and re-establishes proper contact. And no matter how

Arrangement of vertical milling machine and controls for semi-automatic transverse and longitudinal feeds in milling operations on a connecting rod.



Closeup of semi-automatic milling operations on connecting rod. The work is mounted on the table with template fastened beside it. Tracer and cutting tool remain immovable. Movement of table carries both work and template.

intricate the shape of the template or speed of cutting feed, the template is held in this same constant contact with the tracer finger.

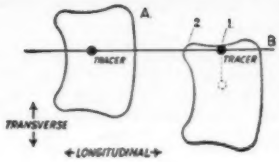
Sketch (A) shows relative position of tracer finger and template. When starter button is pressed, table starts moving forward at cutting feed until template touches tracer finger as shown at (B).

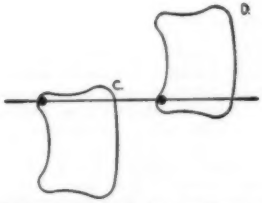
Longitudinal feeding begins the instant template has come into contact with tracer. But traverse feed also continues and keeps template in contact with tracer. Thus, as longitudinal feed is moving template from point 1 to 2, the transverse feed also is moving table with template in conformity with the irregular contour. When the corner (C) has been reached, longitudinal feed is reduced and transverse feed is increased as required to move template along the next side, yet keep it touching tracer at all times.

Meanwhile, milling cutter has been moving along an identical path with respect to the work, thus producing an exact duplicate of outline of the contour of the template.

At each corner of the work, operator merely presses the proper "change-of-direction" button. However, this does not have to be done at any exact point on the radius.

If the operation requires both a roughing and a finishing cut, the same





Sketch showing template contour pattern and contact with tracer.

procedure is followed. First the roughing is made. Then, with a slightly smaller diameter tracer finger, the operation is repeated for the fine finish required.

No major changes in the machine tool are necessary. Separate drive heads replace longitudinal and transverse feed hand wheels. Tracer arm can be removed easily if necessary and the portable control mechanism can be placed where it is readily available to operator.

Alternate Materials

By C. C. STRUEVER*

WITH production of many of our vital war materials now running smoothly, government officials are becoming increasingly receptive to bids from metal working firms based on use of alternate metals which conserve substantial quantities of critical brass, copper, aluminum, stainless steel, nickel copper alloys, chromium, tin plate, and terne plate.

There now appears on many "Invitations to Bid," distributed by government agencies, an invitation to submit an alternate bid based on the use of an alternate metal. This is good news for the small manufacturer because it provides him with a better opportunity to get war contracts and it's good news for the nation as a whole because it means a stronger, better armed nation.

Many metal working firms called upon to submit alternate bids are not entirely familiar with the various alternate metals which are available to them. Like other producers, our duty at American Nickeloid Co., is to inform metal working firms of these alternate metals for war applications, and we are carrying on extensive educational campaigns to accomplish this. These metal working firms seeking alternates will find all leading companies willing to work with them in every possible way to help make their bidding successful.

Pre-Plated metals conserve critical materials because they are composed for the most part of steel, with critical non-ferrous metal plated on the surface. Savings of critical solid copper or brass in the cases of copper or brass plated steel run as high as 98%.

This Plated metal usually eliminates need of painting, galvanizing or finishing in any way, since the plated metal surface provides adequate protection in most cases. Where desired, the surface can be lacquered for increased durability.

Each war product calls for individual consideration and the manufacturer, before placing an alternate bid, should investigate his alternate metal carefully to make sure that it meets all requirements. In our own case, our engineers are usually called upon by the manufacturer to determine this fact.

Pre-Plated Metals are available in sheets, long continuous coils for automatic fabrication, strips and round edge flat wire. They are available plated on one or two sides—in bright or satin finishes, or not polished at all. The metals are workable — for forming, drawing, bending, stamping or soldering. In cases where the fabrication operation is extremely severe, the metals can be obtained in Paper Adhered form—that is, covered with a protective sheet of paper which peels off after fabrication.

Pre-Plated Metals are now used by the government for stowage boxes, first a id packets, reflectors, containers, boxes, dispatch cases, army kitchen equipment, mirrors, hospital furniture and squeegee plates, and are under consideration for many more products of an equally varied nature.

The ingenuity of the individual manufacturer in suggesting the right alternate material for a given product to the government will not only keep his own organization intact but will render a real service to America.

*Gen. Mgr., American Nickeloid Co., Peru, Ill.

Solders

For general purpose soldering 40% tin and 60% lead has been the popular composition thru the G-E Co. in the past. As an alternate for these materials several compositions of lower tin content have been proved applicable.

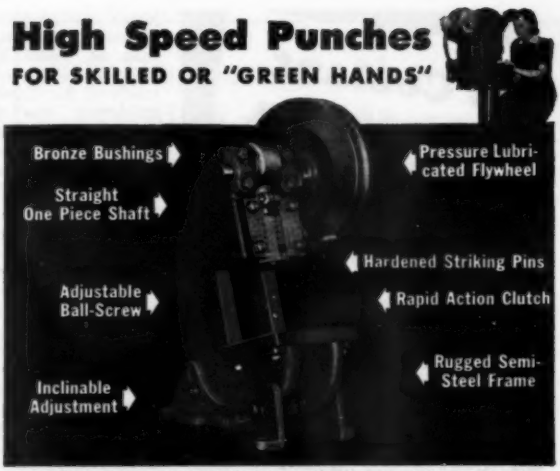
Some of these, such as the 20% tin, 1% silver, 79% lead have been found adaptable with but minor changes in technique, temperatures and operating schedules. Others, such as the 97½% lead, 2½% silver composition, have not proved immediately applicable for use with the available soldering irons and also require modifications in technique and incur lengthened operation schedules. Other combinations also are being tried.

Another case of a change from soldering to brazing is represented by transformers where all the copper conductors including application of terminals, have been brazed for some years because of the superior quality of joints obtained by this method. About 60 different types of joints and connections in electrical conductors are designed to be heated with carbon blocks and to be made up with Silfos. Portable brazing tongs permit terminals to be applied in almost any location.

In the use of soldering pots for hot dipping, good results have been obtained with 90% lead, 10% tin, and experience is rapidly being gained with this and similar low-tin content materials. A complete changeover will be made soon.

There are cases in which we have had no success to date in the search for substitute solders. One of these takes in the soldering of leads to commutators where pure tin appears to be the only material that will give safe

High Speed Punches
FOR SKILLED OR "GREEN HANDS"



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The Duro shaft construction is novel in that it is composed of a large precision ground eccentric, press-fit, and keyed to a straight precision ground shaft. This feature offers a shock-absorbing bearing surface many times that of the conventional crankshaft design, with no weak or thin points to shear or fail.

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The output of the finest machine is limited by the proper flow of cutting oils and coolants. There is an Eastern Coolant Pump model which will assure proper coolant handling for any requirement, at any rate of flow, any head and discharge.

Features:

★ Complete line of mounting accessories, allowing immersion or external mounting or independent mounting on feed line.

★ Offered in tall and short types for various shaped coolant tanks.

★ Can be throttled to deliver any flow desired.

EASTERN ENGINEERING COMPANY

42 Fox St., New Haven, Conn.

joints under temperatures reached in actual operation, particularly in the case of small high-speed armatures. Because of centrifugal force, solder tends to be thrown out from joints at relatively low temperature, whereas pure tin remains solid and does not fail in this respect until the melting point of tin is reached.

Substitutions that have been made, and those that will be made in the very near future, account for tin savings of more than 50% of all tin that would be required if these alternates were not in the picture.

An interesting test result was arrived at in the investigation of low-tin solders. Having observed that lead-silver solder was much inferior to 60-40 tin solder when subject to vibration, the question arose as to whether a terminal soldered to cable with the lead-silver composition would be weaker than the cable itself. This question was checked with cables having the terminal at one end soldered with tin and the other with lead-silver. Completed, these cables were vibrated some 550,000 times and in each case the cable failed approximately ½" from the terminal, indicating that the lead-silver solder is fully satisfactory for soldering terminals to cables subject to vibration.

How To Go After War Work

A large pictorial 24-page bulletin entitled—"Conversion—How To Go After War Work" has been issued by the Division of Information, War Production Board, Washington, D. C. It is packed with hints, tips and guides for plants desiring to participate in the war effort. The functions and locations of the various WPB Field Offices are given, telling just how and where to start the search for subcontract work. The Federal Procurement Offices are listed. Many of the illustrations are scenes in plants that have already converted. An interesting section emphasizes that not all of the conversion is being made to arms production. The fighting men need many things—food, shoes, clothing, housing, fuel and lots of items besides weapons. Many luxury lines have already converted for war production.

Standardization

War has regimented the Great Individualist of the machine age — the steam turbine—into the ranks of the army of mass production goods being produced to smash the Axis, and it can be kept marching profitably for the utility industry when the Victory Parade is over.

Chester H. Lang, vice president of G-E Co., said that the job now being done in turning out propulsion turbines for the Navy and the merchant fleet has proved the practicability of repetitive manufacture of standardized designs of heavy apparatus. It makes possible lower costs, and fosters, rather than restricts, the development of more efficient machines because engineering talent can be concentrated on a small number of promising designs.

Production of propulsion turbines resulting from concentrating on a few standard ratings has been astounding to his company.

"We built a shining new plant with a capacity to produce nine 30,000-hp ship-propulsion turbines a month. We whistled bravely, knocked on wood, and kept our fingers crossed because at Schenectady we have never averaged more than 3 or 4 units of comparable size per month, because they were practically all different.

And we're going to produce several times that many, due to duplicate manufacture of a standardized design.

Citing the manner in which the utility industry has furthered the advancement of standards for such things as meters, distribution transformers, and lamps, Mr. Lang stated that there should be no reason for not exploring the possibilities of extending the same standardization to heavy apparatus.

"There is no obstacle other than habit or tradition that stands in the way of extension of standardized manufacture, with all its resulting advantages, to the substation, and the transmission system.

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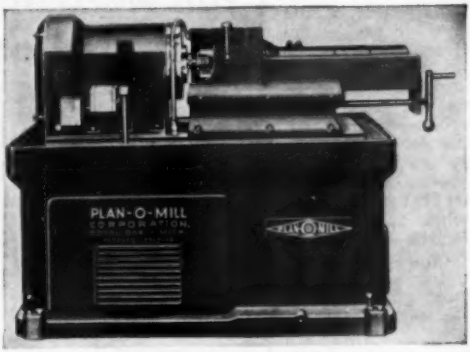
REAMERS • TOOL BITS

Improving the Plan-O-Mill



The Plan-O-Mill Corp., Royal Oak, Mich., announces a further improvement in its standard planetary milling machine, the Plan-O-Mill Model 3. This involves the use of a G-E Thy-mo-trol feed control, built into the machine.

Thy-mo-trol is a new development of the General Electric laboratories, and its use as standard equipment on the Plan-O-Mill is believed to be an innovation. Converting a-c into d-c, Thy-mo-trol provides an infinite and stepless range of feed, both into and around the work, by regulating the flow of current to the feed motor. Changing gears and sheaves is unnecessary.

The new Plan-O-Mill development is designed to promote maximum production consistent with maximum cutter life. Parts too cumbersome or irregular in shape for the conventional milling machine are said to be milled speedily and accurately on the Plan-O-Mill, since all motion is in the milling head. The part does not move. On even the largest job, the time required to reverse cutter and return it to center is reduced to 15 seconds or less, according to the makers.

The new model is designed and widely used for internal and external, right or left hand, threading and form milling where rapid production, precision, and high finish are required. It is also suited to many types of form milling.

Incidentally, the Plan-O-Mill Corp., was formerly known as the Gordon-R-Company.

Floor Surfacer

A new idea in the preservation of floors is Colorflex Plus, made by Flexrock Co., 2305 Manning St., Phila., Pa. It is a dust proofer and floor preservative plus an artistic dye-like coloring. The preparation is asserted to increase the wear resistance of the floor greatly. It is also claimed to remove dirt, grease, oil, foreign matter, and excess alkali.

It is available in tile red, emerald green, battleship gray, and linoleum brown. It is said that porter or jani-

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These files are available in a number of different styles and sizes, in either High Carbon Steel or High Speed Steel.

Send for catalog showing a wide variety of standard shapes and special shapes. Perhaps we have what you want in stock, if not, we can grind it.

The Rotary File Co.

Hand Cut

If you have need for special shape Files, we shall be glad to submit the desired File for your approval and trial upon receipt of a sample or sketch.

This service is designed especially for your convenience, for which we make no charge.

STRATFORD, CONNECTICUT

tor can cover large floor areas in a fraction of the usual time, and that it will dry overnight.

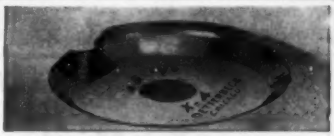
According to the makers, on concrete floors it eliminates sanding, dusting and powdering, preventing development of rough worn and broken floors.

Metal, Rope and Belt Preservatives

A line of preservatives is being made by Ensign Products Co., 3528 E. 76th St., Cleveland, O. Their Ensign 395 metal preserver is said to penetrate into the pores of metal, wood, or concrete, inhibiting hidden rust, and expelling moisture and oxygen. By adhesion, it is claimed to bond itself strongly with the surface, tightly sealing it. In addition, it is effective from below zero to 400F, according to the makers.

Ensign 371 is claimed to clean, preserve, and protect all kinds of belts, including those made of rubber. Belts run slack and never slip, it is said, because 371 restores a natural flexibility to them by working into the fibres, opening the pores, and creating a clean live belt surface that holds to pulleys thru suction.

Rope, like machinery, must be lubricated, and 384 rope preserver lubricates internally the entire rope, whether wire or fibre. And according to the makers, 384 does not run off or drip in temperatures over 135F, and does not harden, crack, or chip in sub-zero temperatures.



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P-2

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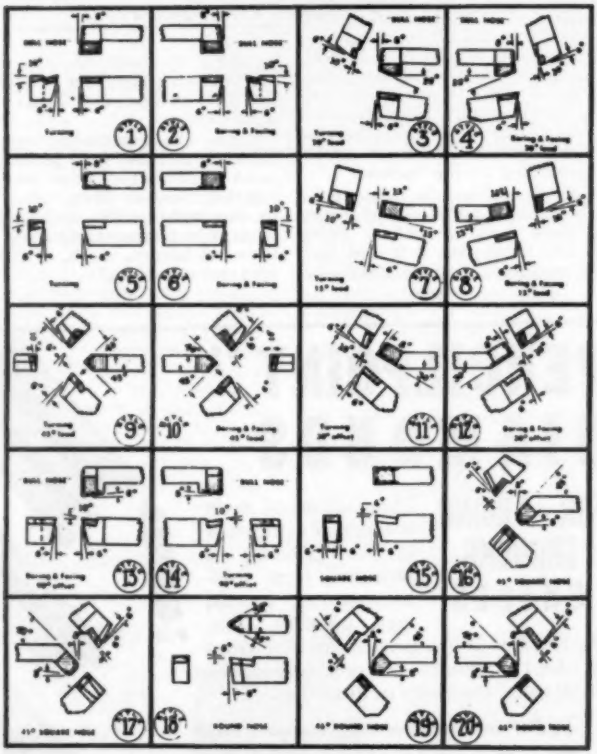
We provide secondary front and side clearance angles to facilitate regrinding



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Consume a minimum of vital cutting material by using tipped tools

General Tool & Die

DIE CORPORATION

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FINISHED TOOL PRICES IN LIGHT FIGURES—MILLED AND BRAZED TOOL PRICES IN BOLD FIGURES

SQUARE SHANKS

Shank Symbol	SHANK SIZE	Straight Shank Styles 5, 6, 9, 10, 15, 18 IN LOTS OF 1	2-4	5-9	10-49	Bent Shank Styles 1, 2, 3, 4, 7, 8, 11, 12, 13, 14, 16, 17, 19, 20 IN LOTS OF 1	2-4	5-9	10-49
A	⅜ x ⅜ x 2½	$2.00	$1.75	$1.55	$1.35	$2.50	$2.20	$1.95	$1.70
		1.55	**1.38**	**1.29**	**1.14**	**1.90**	**1.69**	**1.58**	**1.48**
C	½ x ½ x 3½	2.30	2.00	1.75	1.55	2.90	2.60	2.25	2.00
		1.76	**1.55**	**1.46**	**1.29**	**2.18**	**1.97**	**1.82**	**1.66**
D	⅝ x ⅝ x 4	2.75	2.40	2.10	1.90	3.55	3.10	2.70	2.50
		2.08	**1.83**	**1.70**	**1.61**	**2.64**	**2.32**	**2.15**	**2.05**
E	¾ x ¾ x 4	3.45	3.00	2.60	2.40	4.45	3.75	3.10	2.85
		2.63	**2.31**	**2.12**	**1.98**	**3.43**	**2.98**	**2.65**	**2.48**
F	⅞ x ⅞ x 5	4.15	3.65	3.20	3.00	5.40	4.55	4.00	3.70
		3.28	**2.83**	**2.63**	**2.48**	**4.05**	**3.56**	**3.29**	**3.09**
H	1 x 1 x 7	4.74	4.24	3.79	3.59	6.14	5.29	4.49	4.29
		3.62	**3.27**	**3.09**	**2.94**	**4.89**	**4.25**	**3.89**	**3.69**
J	1¼ x 1¼ x 7	6.32	5.82	5.37	5.12	7.82	6.93	6.02	5.80
		4.76	**4.41**	**4.21**	**4.12**	**6.22**	**5.52**	**5.02**	**4.87**
K	1½ x 1½ x 10	8.90	8.40	7.95	7.70	11.70	10.40	9.45	9.10
		7.10	**6.73**	**6.55**	**6.35**	**9.90**	**8.73**	**8.10**	**7.85**
L	2 x 2 x 12	13.70	13.20	12.75	12.50	18.00	16.75	15.50	15.00
		11.86	**11.46**	**11.26**	**11.00**	**16.00**	**15.00**	**14.25**	**13.75**

"Milled & Brazed" Rexalloy Tools have front and side clearance angles, end relief angle, and any other necessary angles on the shank. Very little time is required to grind these "milled & brazed" tools for use.

RECTANGULAR SHANKS

Shank Symbol	SHANK SIZE	Straight Shank Styles 5, 6, 9, 10, 15, 18 IN LOTS OF 1	2-4	5-9	10-49	Bent Shank Styles 1, 2, 3, 4, 7, 8, 11, 12, 13, 14, 16, 17, 19, 20 IN LOTS OF 1	2-4	5-9	10-49
M	½ x 1 x 7	$3.35	$2.90	$2.50	$2.30	$4.35	$3.65	$3.10	$2.85
		2.70	**2.35**	**2.02**	**1.92**	**3.28**	**2.82**	**2.48**	**2.30**
N	⅝ x 1¼ x 8	4.45	3.95	3.50	3.30	5.85	5.00	4.20	4.00
		3.33	**2.98**	**2.70**	**2.52**	**4.60**	**3.92**	**3.58**	**3.40**
P	¾ x 1½ x 9	5.55	5.05	4.65	4.45	7.30	6.25	5.45	5.25
		4.30	**3.98**	**3.73**	**3.57**	**5.85**	**5.20**	**4.77**	**4.57**
R	⅞ x 1¾ x 10	7.60	7.10	6.65	6.40	10.10	8.90	7.90	7.55
		6.05	**5.68**	**5.60**	**5.40**	**8.40**	**7.60**	**6.90**	**6.65**
S	1 x 1¼ x 7	5.45	4.95	4.45	4.20	7.13	6.08	5.35	5.00
		4.23	**4.00**	**3.55**	**3.40**	**5.98**	**5.20**	**4.80**	**4.60**
T	1 x 1½ x 10	6.60	6.10	5.65	5.45	8.60	7.50	6.65	6.30
		5.26	**4.91**	**4.62**	**4.42**	**7.13**	**6.41**	**5.91**	**5.71**
V	1 x 2 x 12	9.40	8.90	8.45	8.25	12.20	10.90	9.95	9.60
		7.60	**7.23**	**6.93**	**6.75**	**10.40**	**9.23**	**8.83**	**8.53**
W	1½ x 2 x 12	11.20	10.70	10.25	10.00	15.70	13.95	12.45	11.95
		9.56	**9.16**	**8.90**	**8.70**	**13.50**	**12.60**	**11.80**	**11.00**
X	2 x 2½ x 14	15.75	15.25	14.75	14.25	19.75	18.60	17.35	16.55
		13.52	**13.17**	**12.72**	**12.48**	**16.37**	**15.57**	**14.84**	**14.42**
Z	2½ x 3 x 18	22.30	21.80	21.30	20.30	28.30	26.55	25.05	23.55
		19.29	**18.99**	**18.49**	**18.09**	**21.59**	**20.59**	**19.59**	**18.59**

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Cast Iron and Semi-steel	50% to 200%
Tough Alloy Irons	100% to 300%
Steel Castings	50% to 200%
Tough Alloy Steel Forgings	100% to 400%
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GEARED HEAD HAND MILLER

Table: 6"x24"
Capacity 5½"x8½"x18"

Geared Spindle Speeds — 6 forward, 6 reverse. Optional spindle speed ranges available. 150-675 r.p.m.; 200-900 r.p.m.; 350-1350 r.p.m.

Built in coolant pump and piping motor in base.

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Nickel, Chromium Priorities

In a move to conserve nickel, chromium and their alloys, the War Production Board has assumed control over the production and distribution of many types of instruments, regulators and control valves used in general industrial processing and in the manufacture of war materials. Many of these instruments, highly technical in character, are required by war industries.

Conservation Order L-134 has been issued covering 28 specific items forming component parts of industrial processing instruments and valves and regulators. In certain cases, it restricts the size and maximum chromium and nickel alloy content of these items. In addition, it limits the use of instruments containing these critical materials to certain specified operating conditions.

It is estimated, on the basis of statistics for 1941, that the restrictions imposed by the order will result in savings this year of at least 283,000 pounds of nickel and 60,000 pounds of chromium.

The order outlines manufacturing specifications for various types of instrument parts, such as valves, nozzles, protective tubings, thermocouples, sockets, etc., and sets forth the use to which these parts may be put.

Under the general restrictions, manufacturers are prohibited from processing any chromium, nickel or alloys of these metals in producing any instrument parts except for use under the operating conditions specified. 30 days after the date of order's issuance (May 26), manufacturers may not deliver any parts except for the specified uses. Effective immediately, they cannot deliver these instrument parts, no

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3A	1½" to 2"	23.00
4A	2" to 3"	34.00
5A	3" to 4"	40.00

TYPE B—STRAIGHT JAW DESIGN

Size	Range Bores Taken	Net Price
1X	½" to 9/16"	$10.00
2X	9/16" to 21/32"	11.00
3X	21/32" to ¾"	12.00
00	¾" to ⅞"	14.00
0	⅞" to 1"	16.00
1	1" to 1¼"	18.00
2	1¼" to 1-9/16"	21.00
3	1-9/16" to 2"	29.00
4	2" to 2½"	40.00

(Other Sizes taking up to 7")

ECONOMY TOOLS . . . for holding work while being machined between centers on lathes, grinders, millers, shapers, etc. Hardened tool steel, accurately ground. Sold singly or in sets. Prompt delivery. Write for bulletin.

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COOLANT PUMPS—for handling cooling oils on machinery. Complete assemblies and special models designed to be incorporated directly into the machinery. Automatic reversing and pressure releasing types. Capacities up to 50 gpm.

LUBRICATING PUMPS—including complete assemblies and special models for incorporating directly into the design of the machine. Automatic reversing types. Capacities up to 50 gpm.

HYDRAULIC PUMPS—for hydraulic operation on machine tools, engines, and other mechanisms.

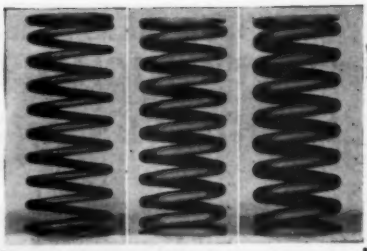
LIQUID TRANSFER PUMPS—for heavy and light oil and non-corrosive liquids. Capacities up to 200 gpm.

FUEL OIL PUMPS—for supply or booster purposes. Capacities up to 50 gpm.

Forget your pump worries. You can always count on Tuthill's positive displacement internal gear rotary pumps to meet your small pump requirements. Tuthill pumps are known for their dependability, economy and long life as proved by hundreds of thousands in the field. Make Tuthill your source of supply for these outstanding pumps.

Check your pump needs and write for full details today

TUTHILL PUMP COMPANY
941 EAST 95TH ST. CHICAGO, ILL.



THREE LINES OF
DIE SPRINGS 300 SIZES IN STOCK

Three complete lines of Die Springs: Medium Pressure—50% Deflection; Medium-Heavy Pressure—37½ Deflection; and High Pressure—30% Deflection.

Heat Treated Alloy and common screws—Cerromatrix Hardsteel Drills — and other Die Makers supplies and Accessories.

SEND FOR CATALOG

DIE SUPPLY COMPANY
1400 E. 30th Street, Cleveland, Ohio

matter what the intended use is, except upon a preference rating of A-10 or higher.

Manufacturing specifications set forth in the order take effect 60 days after the date of issuance. After that time, manufacturers must follow these specifications as well as restrict their production to instrument parts designed for the specified operating conditions.

The order also prohibits any person from accepting delivery of any instrument part unless he expects to install the item which is being delivered, and all similar items on hand, within the next 90 days. Persons receiving these parts must certify to manufacturers or distributors that the equipment received will be used only in the operating conditions permitted under the terms of the order.

The order does not apply to any instrument which does not contain nickel, chromium or their alloys, or instruments manufactured prior to May 20. Deliveries intended for the Army, Navy and Maritime Commission will not be affected by the restrictions until 90 days after the issuance date.

Heat Treating

Induction heat treating is doing its share to help increase vital war production. With the process, hours have been changed to seconds in many cases in giving hardened surfaces to such important machine parts as crankshafts, camshafts, axles, and gear teeth.

This surface hardening of parts is done because the safety, durability, efficiency, and productiveness of a machine depends upon the durability of its moving parts.

The process is based upon the fact that heat is produced in metal when an alternating current is sent thru it. Current can be sent directly thru it, or induced in it by a current - bearing coil or wire.

By this means, heating of metal can be precisely controlled as to temperature and location. Heating of a gear wheel, for instance can be made to penetrate no farther than its teeth.

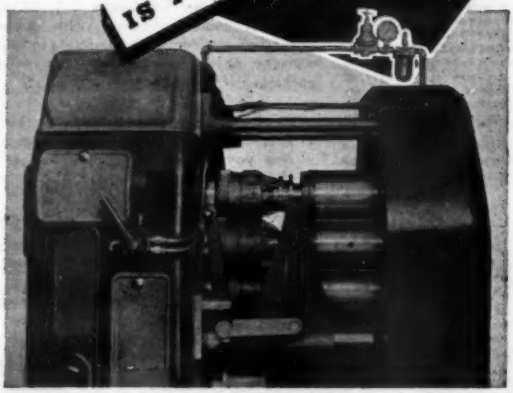
This process, combined with a quick quenching device, has been used in the Tocco process of the Ohio Crankshaft Co., 3800 Harvard Av., Cleveland, O. An operator at the plant recently gave a graphic demonstration of the localization of heat with the process.

About 2" at the end of a shell forging was heated to 2100F. Yet the heating was so rapid (13 seconds) and so localized, that the rest of the foot long forging did not become hot enough to heat the man's hand.

Instances of the time saved thru the process include that of a tractor company cutting time of surface hardening gear shifter fork shafts from several days to 120 an hour; enabling a maker of sprocket gears to cut treating time from 10 to 1½ minutes, and a manufacturer of rocker shafts who replaced an 8 hour carburizing cycle with the Tocco process taking 36 seconds.

LUBRICATION WORTHY OF A GREAT MACHINE

IS YOURS?



Air cylinders of ACME-GRIDLEY Automatic Chucking Machines use NORGREN Lubro-Control Units ...(1)filter air, (2)regulate pressure, (3)lubricate every working part automatically with air-borne fog of oil.

Get Catalog 400

C. A. NORGREN CO. DENVER COLORADO

Eliminates Some Costly Tools

CASE HISTORY Number 4.

The adapters are clamped on a "V" block which in turn is mounted on a rotating table on a milling machine. A slotting tool ground to the exact dimension specified is fastened to the clapper box tool holder . . Each spline is cut in a few minutes—after rotating to a new position—the operation is repeated until all of the splines are cut accurately, dimensioned and equally spaced . . . Broaching—the only alternative—would have involved the expense of a series of broaches and broaching operations, because the splines stop at the shoulder of the adapter . . . . Use of the SLOTMASTER required no tooling expense and only one set-up.

SLOTMASTER can be used on milling machines and provides double duty facilities at a minimum cost. It requires but little time to change-over from one head to the other . . The stroke of the ram is adjustable from 0 to 4" . . the speeds range from 50 to 250 s.p.m. The tool holder of the clapper box type, can be turned in any position . . All of the working parts are of tool steel heat treated and ground to close tolerances . . SLOTMASTER comes complete with pulleys, motor, belt and mounting adaptable to round over-arm or flat-on-round-overarm milling machines.

Send for 4-page catalog and give the specifications of the milling machines that you wish to equip. Immediate deliveries on high priorities.

EXPERIMENTAL TOOL & DIE COMPANY
12607 Greiner
Detroit, Mich.

Conventional set - up on round over - arm milling machine.

Conservation

In general, conservation as practiced by G-E Co., may be resolved into several distinct classes along the following lines:

1. Conservation by straight substitution involving a direct change from one material to another without any significant modifications in design or in application. An example would be a change from cast tin-base to tin-free bronze. Attainable characteristics and properties of the alternate material may be sufficiently close to those of the original material so that a part or product of the original may be replaced directly with its equivalent produced from the alternate material without any changes in manufacturing except for some modification in the casting procedure.

2. Another class of conservation involves a reduction in quantity of material used. For instance, a substantial reduction in tin used can be achieved by changing to thin-walled babbitt designs. Also in this particular instance the principal difference between the use of new and old constructions may lie in a change of casting technique.

Another example of the same class may involve the use of the same material as before, but to do this from the viewpoint of material scarcity rather than from the standpoint of ease and economy of manufacture. Parts made from sheet material may fall within this group, and a different laying out of the pieces possibly with resort to welding of multiple pieces into the final shape may save material.

3. A final class of conservation may take in the change to alternates with a consequent need for changes in design and most likely also in manufacturing. An obvious example of the

character would be a change from aluminum to steel construction. If this concerns a sizeable assembly, a complete redesigning job is apt to be involved and besides, an extensive change in manufacturing, both in method and equipment, will usually be required.

This latter type of conservation therefore commonly represents an undertaking of such a scope that the time and effort required for its execution all the way from the designing board down to factory floor, may be of almost alarming proportions. At the present time with the critical material situation, there may be no other choice but to proceed with the sought conservation even at the expense of a considerable tying-up of man-hours and equipment that could otherwise be used to good advantage for other work.

Engineering Essentials for Welders

Most of the important engineering aspects of welding are covered in a paper prepared on this subject by H. Malcolm Priest, Engineer, Railroad Research Bureau, U. S. Steel Corp. Subsidiaries. The presentation is in form so simplified that it is readily usable by welding operators and by junior executives who have a limited background of technical training.

Stated objective of the paper is to establish an understanding of the principles of engineering involved in the welding of a structure between the designing engineer and the fabricator, and also to point out to the welding operator, his share in the responsibility of safe and efficient welded construction. The designer will find in it numerous practical ideas, whereas the welding operator and the welding student can make good practical use of the wealth of fundamental engineering information which it contains. This paper is published by the American Welding Society, 33 W. 39th St., New York City, in the form of a 24 page booklet available at 25c per single copy, with discounts for quantities.

The New CATSKILL — WET-TYPE
Abrasive Cut-Off Machine

Abrasive wheel cutting is the modern way to speed up operation and lower cutting cost. This machine cuts tubing to 3", solids to 2" accurately, smoothly. Especially recommended for cutting high alloyed hard steels and many other materials. Designed and engineered for high production, ease of operation, safety, and long life. Prompt delivery.

For detailed information, write for Bulletin No. 6.

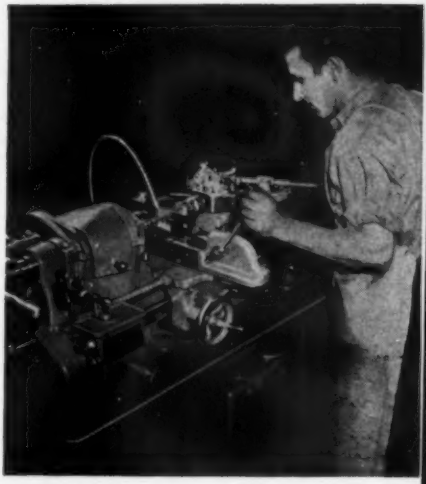
CATSKILL METAL WORKS, INC. — CATSKILL NEW YORK

South Bend Offers New Small Turret Lathe

A new bench model Turret Lathe for rapid production to close tolerances on chucking operations or bar work has just been announced by South Bend. This lathe has a 10" swing over the bed and saddle wings, 1⅜" hole thru headstock spindle, and 1" collet capacity. It is well adapted to second operation work.

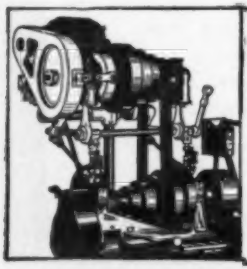
The handlever operated bed turret indexes automatically and has an adjustable stop for each of the 6 turret faces. The lathe is equipped with both a compound rest cross slide and a handlever cross slide, which are interchangeable. The latter is furnished with front and rear tool blocks which provide 3 tool positions. A quick change gear box supplies 48 longitudinal power feeds for the universal carriage, 48 power cross feeds for the compound rest cross slide, and 48 thread cutting feeds, 4 to 224 per inch. The underneath motor drive and back gears deliver 12 spindle speeds, from 97 to 700 rpm.

A large assortment of attachments and accessories simplify tooling for specialized work or second operation jobs. For information, address South Bend Lathe Works, Department M6, South Bend, Ind.



Weight of Words

The ordinary small Westinghouse Mazda lamp owes much of its lighting efficiency to the exactness of the diameter of its tungsten filament wire. This wire is so thin it is measured by weighing it on scales accurate within 40 billionths of a pound. These scales are sensitive enough to weigh a penciled signature. The written words "Westinghouse Electric," for example, weigh about two-tenths of a thousandth of a gram and it takes about 28 grams to make an ounce.



Noiseless! Instant Speed Changes

Speed changes are made without removing tool from the cut where Remco Drives are installed. Less down-time. More output. No tool marks. Motor takes hold gradually by slipping belt—simple friction clutch action. Shockless! Remember, Remco is the only drive on which the motor may be switched instantly if "burnt out." Folder FREE—Write ! Remco Products Corp., State St. at R.R., York, Pa.

REMCO MOTOR DRIVES

for LATHES, SHAPERS, DRILLS, MILLING MACHINES, etc.

Salvage

Lessing J. Rosenwald, Chief of the Bureau of Industrial Conservation, today congratulated the War Production Drive Committee of the Grasselli, N. J., plant of duPont Co. on its report of an outstanding salvage campaign.

Their labor-management committee reported that the salvage campaign in one month netted the following materials:

100.5 tons of scrap iron, 9.5 tons of hard lead, 5.25 tons of copper, 3. tons of brass, 1.75 tons of aluminum, 1.75 tons of stainless steel, .50 ton of rubber, .25 tons of monel.

Details of the report follow: "The company formerly burned off the rubber insulation from copper wires and cables so as to salvage the copper. It now salvages the rubber by squeezing the wire or cable thru a set of rollers, permitting rubber to be removed from wire easily.

"All short stubs of welding rods are saved for return to welding supplier for credit. All worn out or broken steel punches, dies, drills and high speed tools are salvaged.

"On its lead-burning operations, it is supplying the lead-burners with wooden buckets so that the lead scrapings can be salvaged.

"All burned out electrical fuse cases are collected and returned to the maker for refilling. Dry cell batteries are collected when worn out for the zinc salvage. All waste burlap is being collected.

"Metal motor covers, coupling guards, machine guards and brackets are being standardized to conserve steel.

"The company is using wood as a substitute for iron and steel wherever practicable.

"To conserve on rubber hose and ex-

MORE OUTPUT

30 KV Ace Welder in plant making munitions parts

Motor-Driven Welders Speed up Vital War Production

Faster spot welding is one way to get more output per man. Ace Welders are production tools designed for today's needs for steady, fast quantity production. They are in daily service in essential War plants. Their operation is so simple that expertness can be acquired by men or women operators in a very short time .... For more production per man-hour, put more Ace Welders on the job. They are made in a range of capacities, both manual and automatic motor-driven types .... PIER EQUIPMENT MFG. CO., 1446 Milton St., Benton Harbor, Michigan.

Ace Welders and the new Automatic Weld Timer are described in new Catalog 42. Write for a copy.

PEER

ACE SPOT WELDERS

Control DUST with DUSTKOP

No tools necessary to install! Compact, self-contained, with motor driven fan. DUSTKOP pulls in the dirt-laden air, cleans and returns it to the room through easily removed, spun-glass filters. Immediate deliveries on priorities.

AGET-DETROIT MFG. CO.
2046 Book Tower CAdillac 3090 Detroit

★ *Write for Bulletin A-500*

pensive regulating valves for gauges, manifolds and short leads are used for leadburners. In this manner as many as 6 leadburners are supplied with oxygen and hydrogen gas from one assembly.

"At one time all electrical extension cords were discarded when the rubber insulation was found defective. Cords that are in sufficiently safe condition are vulcanized. After repairs are made the cord is tested with a violet ray machine to assure full and safe protection to the user.

"For salvaging purposes the vulcanization process is further carried to rubber gloves, rotex screen stockings, rubber boots, overshoes, etc.

"To get longer life from high speed tool steel punches and dies, these tools are being Stellited when worn out and reground for further service.

"Valves of all descriptions are collected and repaired as conditions may warrant for re-use. In the conservation of insulated electrical wiring, wiring is measured exactly before being drawn thru conduit.

"Consumption of tetrachloride for cleaning of electrical motors has been considerably decreased by use of steam and water with subsequent drying out.

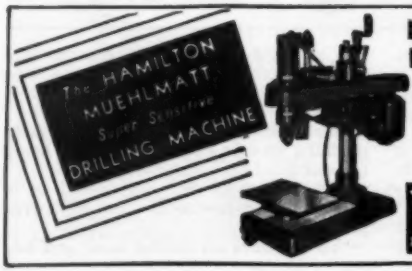
"All bearing metals, such as babbitt, are being collected; also brass bases from all burned out electric bulbs. Extension of paint spraying machines is conserving paint brushes.

"The clear protecting glass, which covers the more expensive blue glass in welder and burner helmets and shields is now being obtained from salvaged window glass."

Alrose Finishing Booklet

A new 9 page booklet has been issued by Alrose Chemical Co., Box 1294, Providence, R. I. describing the Jetal process and its characteristics as a protective coating.

The effect of treatment time, bath temperature, bath composition and surface hardness upon the protective value, penetration and wear resistance of oxide coatings is all discussed, as well as how these factors can be made to increase production, reduce treating time and obtain resultant economies.



EXTREME CONVENIENCE
LONG, ACCURATE LIFE

for drilling small holes .004" to 5/16" dia. and saving small drills which cannot be replaced.

Dept. B-7

THE HAMILTON TOOL CO.
Ninth and Hanover Streets.
HAMILTON OHIO

WHAT ABOUT TOMORROW?

Careful, long-range planning now will prepare you for today's urgent demands and the long pull for tomorrow's competitive reconstruction era. Equip now with these advanced designs in tool holders made by ALCO for every drilling, tapping and thread cutting operation.

Write for latest catalog.

ALCO EFFICIENT TOOLS

THE ALCO TOOL COMPANY
835 HOUSATONIC AVE. BRIDGEPORT, CONN.
DETROIT OFFICE — 906 STEPHENSON BLDG.

Allen Power Bench Type Punch Press

A Small punch press for small work.

Height 17½". Base 8½x8½"
Flywheel 10" D. Wt. 28 lb.
Stroke ¾"
Capacity soft iron ¾"Dx1/16"
Weight 120 lb.
Power required ¼ to ½ H. P.

Price $125.00

Circular on request.

Alva F. Allen, Clinton, Mo.

DANLY **PRECISION DIE SETS**

THEIR PRECISION

Means Greater Accuracy In Your Production

Danly Commercial Sets

Danly Special Sets

DANLY MACHINE SPECIALTIES, INC.
2100 S. 52nd Avenue, Chicago, Ill.

MILWAUKEE • LONG ISLAND CITY, N. Y.
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Ducommun Metals & Supply Co.
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DANLY PRECISION DIE SETS

Tin-Base Substitutes

Two new lead-base bearing metals, known as Pyramid and Defender, have been developed by Magnolia Metal Co., 120 Bayway, Elizabeth, N. J., as substitutes for tin-base babbitts which are now so difficult to obtain.

Pyramid Metal is claimed to be well suited to applications where bearings must withstand heavy sustained pressures, such as are found in marine reciprocating engines, water turbines, paper mill calendar stacks and rolling mill machinery.

Defender Metal is said to stand shocks without cracking and is well suited for use in internal combustion engines, trap rock crushers and sifter machinery.

For steady high speeds and uniform loads such as are found in line shafting, electric motors of 10 to 250 hp, pumps and general machinery, the makers recommend Magnolia Anti-Friction Metal.

War Production Data

The 6th issue of "War Production Data from The Houghton Line" is now being distributed to 25,000 individuals in metal-working plants. This issue contains factual articles on rust prevention, machining 20 mm projectiles, cutting oils for ArmaSteel, manufacture of steel helmets, heat exchangers for cooling oil and data on chambering machine gun barrels.

It is published by E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia.

ESSENTIAL FOR ESSENTIAL INDUSTRIES

CLEMENTS

CADILLAC PORTABLE ELECTRIC COMBINATION

BLOWERS & SUCTION CLEANERS

PROVIDE AN EASY, ECONOMICAL WAY TO RID MACHINERY AND EQUIPMENT OF DUST AND DIRT. DON'T LET DANGEROUS DUST AND DIRT SLOW DOWN YOUR VICTORY PRODUCTION. SOLD ON PRIORITIES ONLY.

CLEMENTS MFG. CO. 6651 S. NARRAGANSETT AVE., CHICAGO, ILL.

See Your Mill Supply Salesman or Write Us Now.

5 MODELS
(1 HP Illustrated)

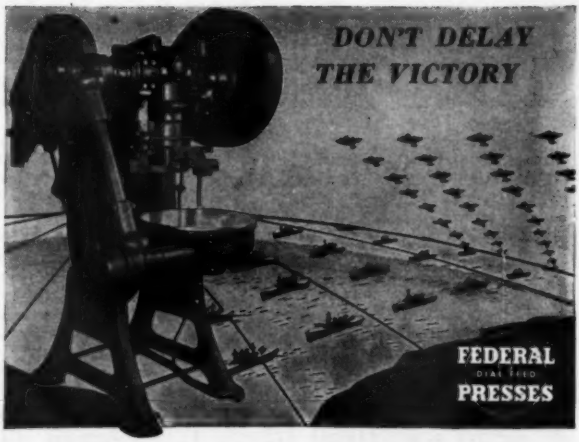
Diamonds

The war and the consequent difficulty in obtaining imports has brought about many changes in this country. A noteworthy example is the announcement that the government has facilitated the establishment of a new war industry adequate to supply the country's military needs of fine wire, which is vital in the construction of much military equipment.

The discovery that American shops are able to turn out in unlimited quantities small diamond dies, which are essential in the manufacture of fine wire and which previously were imported from Europe, brought about a solution of the problem. Modern mechanized high speed techniques and inventive genius have been combined to train hundreds of die makers, with the assistance of the best European craftsmen, and so America has become, within a few months, the leading diamond die manufacturer of the world. America always has been able to meet its own requirements in dies larger than 0.1", but the new production turns out dies which measure beyond .0001".

Diamond dies, made from the hardest substance known, are classed as "tremendous trifles" whose cutting surfaces, altho often invisible to the naked eye, make it possible to draw fine wire essential in the manufacture of aircraft instruments, high frequency radio tubes, resistance wire in all mensural instruments, electric lights, and the vitals of devices on the instrument panels of tanks and bombers.

Methods sponsored by the government, have increased the die industry's capacity. Until last year individuals still manufactured the dies by a process in which perseverance played the ma-



SPEED PRESS OPERATIONS WITH FEDERAL DIAL FEEDS

DON'T let incompetent press equipment delay victory! *Speed up* many operations *3 to 6 times* by using Federal precision-built presses with multiple dial feeds. Positive indexing and locking mechanism smooths out action of dial — permitting unusually rapid production with exceptional accuracy and safety to the operator. Easily indexed to any part of the crankshaft revolution from 90° to 180°, giving long or short dwell of the dial. Cannot skip or coast by stations. Available in eight sizes of Federal Presses. Write for facts today.

THE FEDERAL PRESS CO.
807 Division St., Elkhart, Indiana.

Many Federal Models

Federal Open-Back, Inclinable Presses are available in nine sizes, with capacities ranging from six to 80 tons—either flywheel or geared type. They represent the culmination of Federal's 40 years' intensive experience in press building.

jor part. Tiny holes were worn in the gems by poking at them with continually sharpened needles for hundreds of hours. Now they are drilled scientifically in groups, with new visual inspection aids and high-speed electric motors, by craftsmen who in weeks have acquired skill which formerly required a lifetime to master.

The small Brazilian industrial diamonds, from which the dies are made, have negligible value, but the craftsmanship required to make them hitherto has been impossible to buy. Wi every diamond die of the smaller gra uations in constant use thruout t nation, the Office of Production Ma agement succeeded in making ready fresh supply to meet critical war nee From one family of Frenchmen as nucleus, officials are now credited wi having brought the industry to t point at which assurance is felt that will be able to meet any and all d mands the war efforts of the Unit Nations may make upon it.

Since it has overcome the technic difficulties involved in training wor ers, the industry has manufacture who drill dies less than .00008" in si and in larger quantities dies of .00 are in constant production.

(From Central Manufacturing District Magazine)

MOTOR MICA

reg. U.S. pat. off.

ANTI-FRICTION COMPOUND

An aid for tough lubricating jobs. REDUCES FRICTION. SUCCESSFULLY applied to DIE CASTING, BEARINGS, MOTORS, PUNCH PRESSES, ETC.

SEND FOR SAMPLE and CIRCULAR.

SCIENTIFIC LUBRICANTS COMPANY

3462 N. CLARK ST., CHICAGO, ILL.

"KEEP 'EM ROLLING"

Buy U. S. War Savings Bonds and Stamps

BUY WHITNEY-JENSEN METAL-WORKING MACHINERY and HAND TOOLS for LONG LIFE and ACCURACY

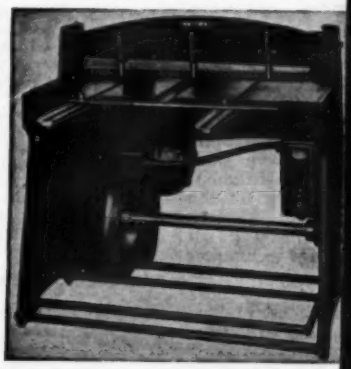
No. 72 SERIES

POWER SQUARING SHEAR

Quick in action, easy to operate, compact in size! This new WHITNEY-JENSEN Power Squaring Shear offers many advantages to sheet metal shops. One outstandingly distinctive feature is the simple, accurate, and positive blade adjustment. Another is the high speed of the machine—180 strokes per minute.

Write today for a copy of our new circular, which gives full description and specifications of the three models available.

OVER 80 USEFUL METAL TOOLS



36' and 42' sizes

14 and 16 gauge

WHITNEY METAL TOOL COMPANY

[illegible] POWER STREET . ROCKFORD, ILLINOIS

Health

High officials arged with in- easing American ar production pealed to War oduction Drive ommittees keep the Amer- n workman fit d healthy to ve man hours victory.

The statement s sent to each bor - manage- ent committee the more than 0 plants which e participating the War Pro- ction Drive. The t follows:

Sick and injured ar production rkers lose 6,- ,000 work-days ery month.

We must save as ny of those lost s as we possi- y can for the oduction Drive.

Only healthy rkers can put to the drive at it takes — gor, staying- wer and the l to win.

t is your job to nt sickness and idents. See to it that every medi- and engineering means of preven- is provided in your plant. Make healthful working place.

Help the men and women in your nt to keep themselves healthy and the job. You can do this by train- them in health conservation and ety as carefully as you train them efficiency.

se your influence to see that your mmunity has an active public health department; enough doctors, nurses and hospital beds to care for your workers and their families. Your Federal and State governments are doing their part. Make sure your community does its part.

If your plant is not already conducting a sound industrial hygiene program, write today to the U. S. Public Health Service, Washington, D. C. for service. You can boost production, save time and lives if you start now. **Save a day for Victory.**

DOUGLAS

PLAIN MILLER

FOR SMALL PARTS PRODUCTION

WIDE RANGE OF SPINDLE SPEEDS from 75 to 1200 R.P.M.

TABLE SIZE 32" x 8'

QUICK DELIVERY BY LARGE SCALE PRODUCTION

DOUGLAS MACHINERY CO. INC.

150 BROADWAY NEW YORK, N. Y.

Turn Heavier Loads Faster

With IDEAL —

LIVE CENTERS

Get more work, quicker, out of lathes, millers, grinders, etc. with IDEAL Live Centers. They rotate with the work, therefore permit heavier loads — faster speeds — deeper cuts. The radial load is carried by a high precision ball bearing, and thrust load absorbed by a taper roller bearing. All parts are hardened and ground.

TRIPLE DUTY

Three Interchangeable Center Pieces (illustrated below) for all kinds of centered and uncentered work. Save set-up time.

OTHER PRODUCTION SPEEDERS

Write for Free Descriptive Literature

IDEAL COMMUTATOR DRESSER CO.

1441 Park Ave., Sycamore, Illinois

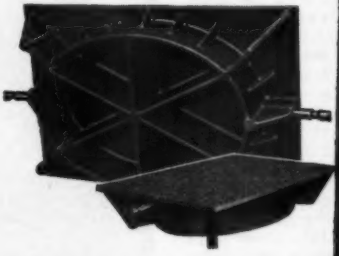
"Sales Offices In All Principal Cities"

In Canada: Irving Smith, Ltd., Montreal, Quebec

Smith Surface Plate

A new design of surface plate ha been announced by Smith Tool Work 828 N. Sandusky Av., Bucyrus, Ohi They are designed to eliminate futur distortion, and it is claimed that seve working tests have shown that the maintain accuracy for a long time.

They are designed with a large ellip tical rib reinforced with 6 point spid rib and supporting ribs to outer edge giving unusual stiffness and rigidit it is said.



New Pier Equipment Catalog

Catalog 41 has just been publish by the Pier Equipment Mfg. Co., Be ton Harbor, Mich., manufacturers Ace Spot Welders. This catalog co tains complete description of the va ous essential elements and the vario types of foot-operated and motor driv automatic welders made. A descri tion of the new Type 47 Automa Weld Timer for use with any size ma ually operated Ace Welder is includ in this latest edition.

The GLENNY

Adjustable-Expansion

BROACH

Produces low cost, accurate ke ways. Eliminates set-up tim Self aligning. Interchangeab parts. Adapted for arbor pres mechanical or hydraulic pre sure. Speeds up productio Cutter bars in carbon or hi speed steel. *Details? Write!*

EAST SHORE MACHINE PRODUCTS CO.

833 E. 140th St., Cleveland,

Production Awards

The War Production Drive headquarters have announced a plan of individual awards to workmen who devise means for more or better war production.

Three different types of awards were announced, and they are restricted to workmen in plants with voluntary labor-management committees organized according to the War Production Board.

The first is the Award of Individual Production Merit given by plant committees to workmen they decide have made suggestions that improved quality or production or conserved critical materials, or in any way increased the effectiveness of war production in the plant.

The labor and management chairmen of the board will sign the certificate. Additional suggestions by the same worker will bring him additional seals on the original award.

The second award is the Certificate of Individual Production Merit signed by a representative of the War Production Board in Washington and given to workmen making outstanding suggestions that have proven well worthwhile in actual use at the plant.

The third and highest award is the Citation of Individual Production Merit signed by Donald Nelson, and given to those who make suggestions having an outstanding effect on the entire war effort.

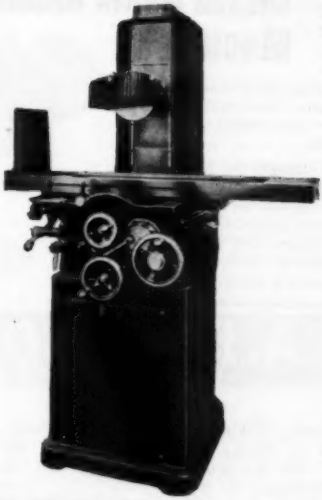
Our Army and Navy have had suitable awards for individual valor, and now here is an award equally suitable for the men backing up with production those in the Services.

This plan, of course, is in addition to any other present plans now in effect for awarding workers with bonuses or other recognitions of merit.

ATLANTIC

No. 2 Automatic Precision Type

SURFACE GRINDER



CAPACITY 6'x12'x18'

PROMPT DELIVERIES

ATLANTIC MACHINERY CORP.

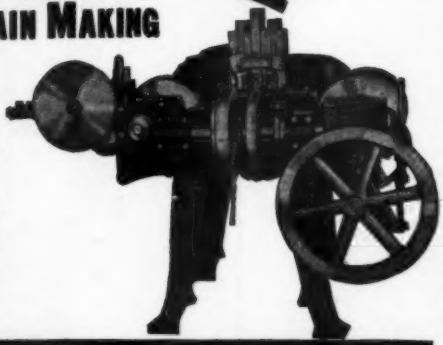
149 BROADWAY, NEW YORK, N. Y.

STRONG STANDARD SIZE CHAINS
WITH THE
NILSON CHAIN MAKING MACHINE

To make a full line of standard size chains as known to the trade, Nilson makes the four necessary sizes of machines. Chains produced by these machines are strong, durable, safe and flexible.

20% increase in strength due to the fact that the ends are tucked in, leaving them perfectly smooth on both sides, enabling one to run them through the hands without injury. They will run accurately on sprockets for conveyors or power transmission purposes.

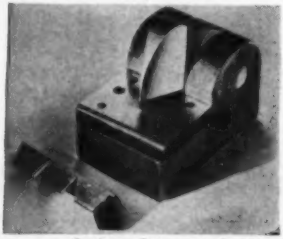
Let us send you complete details.



The A. H. NILSON Machine Co.
BRIDGEPORT, CONN., U.S.A.

New Wales Notching Dies

A new line of Wales Notching Dies is announced by Strippit Corp., 1200 Niagara St., Buffalo, N. Y.



They are designed to notch 11 gauge angle iron right up to the leg. In the case of an angle to be bent, they leave a portion of metal unnotched in the corner to permit easy and exact bending into position for simplified precision welding of the legs.

These dies are self-contained with punch and die in constant alignment. Nothing is attached to the ram of the press. It is said that a line-up of these dies on a T-slotted plate will do a complete notching pattern in one stroke of the press.

Pattern set-up changes with Wales notching dies are only a matter of minutes it is claimed. Flexibility of the dies makes it possible to set up patterns by positioning the holders to a templet and then locking them onto a T-slotted plate.

The dies are available to notch a complete variation of angle sizes.

Micrometer Adjustable Spacing Collars

Dayton Rogers Mfg. Co., 2835—12th Av. S., Minneapolis, Minn., announces a new direction indicator for their precision adjustable spacing collars for milling machine cutter arbors. Graduated in thousandths, it is an easy matter with these collars to space accurately on all straddle, gang, and other multiple milling machine operations where two or more cutters are used, according to the makers.

The engraved direction indicator on outer sleeve of the spacing collar tells

SAVE ON BACK WORK
WITH THE
NILSON TILTING WIRE REEL

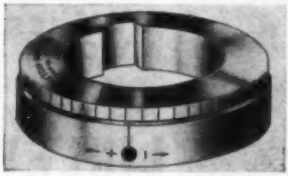
Save back work and all useless motion with the Nilson Tilting Wire Reel.

A foot lever is tripped, the guards removed, a coil of wire slid upon the carrier, the guards replaced and set screws tightened, an easy lift, and the counter-balancing weight does the rest, bringing the tilting section to an upright position, ready to feed the wire into the machine. Simple in operation, and may possibly save your men from sprains, resulting in lost time and production.

Send for bulletin No. 51 and learn how to save in other ways too.

The A. H. NILSON Machine Co.
BRIDGEPORT, CONN., U.S.A.

the operator which way to rotate sleeve to obtain the desired adjustment. It



is said that these adjustable spacing collars not only eliminate the use of milling machine cutter arbor shims, but also make it possible for the operator to get not only the desired adjustment more quickly, but also more accurately, since quarter thousandth graduations are very easily obtained. The collars are made of a special alloy steel accurately engraved and with precision machine quality thruout and made in 11 sizes for all cutter arbors from ⅝ to 3".

V & E Drawing Instruments

Available in 3 combinations of bows, drop bows, and pens, a new and complete line of American made drawing instruments is announced by the V & E Engineering Co., Pasadena, Cal.

Sold under the trade name Vemco, the instruments are said to embody new and unique features of open truss design which increases strength and rigidity while cutting weight by 40%. This rigidity combined with unusual concentricity, it is pointed out, enables the user to describe extra-large, dense circles in pencil without the instrument yielding.

Each bow has a center-screw adjustment which articulates with the legs by cylindrical nuts. The legs bear upon a double-grooved hinge pin of broad base. Construction is of steel, satin-chrome plated. Sets are available in one, two, and three bow combinations complete with dividers and pens, packed in velvet-lined leather cases.

CHICAGO

STEP PULLEYS

SINGLE GROOVED PULLEYS

VARIABLE PITCH PULLEYS

MULTIPLE DRIVE PULLEYS

HAND WHEELS

FLEXIBLE COUPLINGS

SELF-ALIGNING SHAFT SUPPORTS

FLANGED PULLEYS

Manufactured By
CHICAGO DIE CASTING MFG. CO.
2513 W. MONROE ST., CHICAGO, ILL.

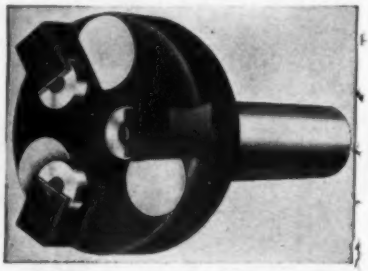
New York Office
PATRON TRANSMISSION CO.
150 GRAND ST., N. Y. — N. Y.

Minneapolis Office
H. A. HOLDEN CO.
300 4th AVE., So. Minneapolis, Minn.

CATALOG ON REQUEST

Boyar-Schultz Burnishing Tool

New addition to the line of Boyar-Schultz tools for screw machines are the Model C burnishing tools, available



in 3 sizes. According to the makers, they are easily and quickly adjusted for efficient work where a smoother surface is necessary than produced by usual machining operations. A bulletin is available from the makers, Boyar-Schultz Corp., 2108D Walnut St., Chicago.

RELEASE LARGER MACHINES FOR HEAVIER WORK

PUT SMALL JOBS ON THIS

LINLEY

VERTICAL MILLING AND JIG BORING MACHINE

This machine is ideal for tool, die, fixture and pattern work. Is versatile and accurate. Micrometer screw feed quill. Direct reading eliminates pencil figuring and possible errors. Smooth accurate boring is assured to any predetermined depth to 3".

Write for descriptive Bulletin.

LINLEY BROS. CO.
11 MONTAUK ST.,
BRIDGEPORT, CONN.

Power Systems

One of the safest and most reliable electric power systems yet installed in a modern industrial plant supplies the Navy's new Ohio ordnance plant. 37 300-kva Westinghouse air - cooled transformers — the greatest concentration of air-cooled units in the country — and a secondary network system will supply the plant load with a maximum 3% voltage variation.

Other advantages of the network include, lower first cost, simplified erection and maintenance, provides over 95% power factor, system is unaffected by future growth or load, and sabotage is difficult.

Incoming power is distributed at 13.8-kv to the air-cooled transformers on platforms above the floor. As a safeguard against failure in one line, two separate primary feeders run to the transformers; each feeder is large enough to carry the entire load.

Under normal operating conditions the 300-kva transformers are supplied at half the carrying capacity of the feeders. If a network transformer or part of an entire circuit fail, protectors and current limiters automatically isolate the unit or the circuit from the system, and remaining transformers share the total plant load.

Douglas PRECISION SLOTTER

FOR TOOLROOM AND PRODUCTION

Swiveling ram head and tool holder, automatic circular table and independent automatic feeds in all directions.

Prompt Delivery by Large-Scale Production

Built with 7", 8", 10" Stroke

DOUGLAS MACHINERY CO., INC.

150 BROADWAY, NEW YORK, N. Y., Dept. 805

The secondary network system for power distribution was adopted for:

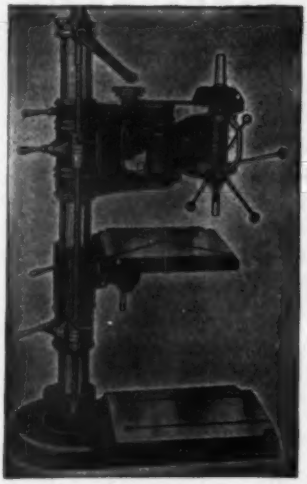
1. Reliability of service. a. Many network transformers are used; the loss of one or two of these units would not interfere with plant operation. b. A secondary network system is installed, segregated by limiter boxes so that the loss of one of these circuits between limiter boxes will not interfere with operations.

2. The first cost of the system is

START NOW!

Increase Production

End Worker Fatigue By Making Your Drilling Job Easier.



Use the

DRILL MASTER RADIAL DRILL

This floor type, heavy duty, precision-made, well balanced Radial is economical in initial cost and operating cost. It offers many features that merit your careful consideration. Drills to the center of a 36' circle . . . No. 2 Morse taper . . . Heavy duty ½ h.p. ball bearing motor . . . Full floating, ball bearing spindle assures free and sensitive operation at all speeds.

Send TODAY for detailed bulletin.

Wm. C. Johnson & Sons Machinery Company

St. Louis **Missouri**

less than for the conventional type of power distribution.

3. The same secondary system can be used to supply power for both lights and motor operated machine tools.

4. Additional load can be taken care of by adding substations without changing the copper in the secondary system.

5. The short distance from the substation to any load causes very little voltage drop, so the voltage is maintained on both the lights and power within 3% of normal value.

6. Installation is simplified. Switches and protective devices are assembled with the transformer making a complete unit.

7. Network transformers have common wiring. Units are joined together so that a demand load in any locality can obtain some of the power from transformers in other parts of the plant.

8. System is easily extended. No independent network transformers are necessary if power is to be supplied to auxiliary buildings.

Previous articles in Feb. and May BLUE BOOK described the system in further detail.

Metalworking Made Easy

A new 135 page book under this name has just been issued by the Bruce Publishing Co., 540 N. Milwaukee, Milwaukee, Wis. It is profusely illustrated with drawings of many simple metalworking operations, together with complete directions on how to perform the many various operations. Selling price is $1.60.

SCHAUER Speed Lathes

Variable Speed

Ideal for lapping filing, polishing small metal and plastic parts.

Write for Catalog 400.

Schauer Machine Co.
2064 Reading Rd.
Cincinnati, Ohio

Glare

Protective lighting in reverse, a new type glare barrage using high - powered spotlights, has been developed to blind would - be saboteurs as they approach restricted zones around war plants.

The new system makes it possible for the first time to keep guards and buildings in comparative darkness while areas thru which saboteurs would have to pass are brilliantly lighted.

Instead of playing lights on buildings, the beams are turned outward to direct a blinding glare in the direction of intruders. Thus, guards patrolling in the shadows command a view of several hundred yards, somewhat in the manner that a night driver sees all objects on the road ahead of him while a pedestrian can see only the confusing glare of his headlights.

Each unit is equipped with a high-powered lens constructed to project a flat, fan-shaped beam of light. Batteries of these lamps are mounted on posts several feet away from the buildings to be protected.

Space between the buildings and the lamps becomes a "no man's land" of darkness even preventing any accurate observation of the plant's activities from a distance. In ordinary protective systems where lights are used to floodlight buildings, intruders often may come within 100' of the restricted area in the safety of relative darkness.

Janette

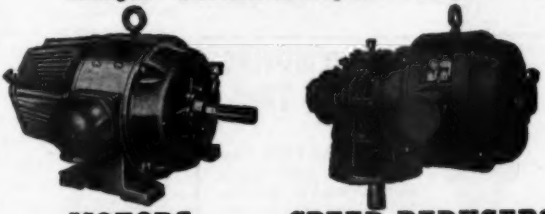
DEPENDABLE ELECTRICAL MACHINERY

GENERATORS

20 to 6000 Watts—D. C. and A. C.—Special and Standard Types and Voltages.

MOTOR GENERATORS

20 to 6000 Watts—D. C. or A. C.—Frequency Changers—Standard and Special Voltages.



MOTORS

1/50 to 7½ H.P.—D.C. and polyphase A.C.

SPEED REDUCERS

1/50 to 7½ H.P.—47 Types .08 to 1140 r.p.m.

Janette Manufacturing Company

554-558 West Monroe Street Chicago [illegible]

Norton Abrasive Booklet

A new 6 page booklet has been issued by Norton Co., Worcester, Mass., describing the improved strength claimed for their "B-E" bond wheel for traverse and plungecut OD grinding jobs, both cylindrical and centerless.

HPM Forging Press

The all hydraulic self-contained Fastraverse forging press has been announced by Hydraulic Press Mfg. Co., Mt. Gilead, Ohio. The makers claim 4 main advantages over steam-hydraulic presses:—

1. Lower initial cost, since auxiliary equipment such as steam boilers, intensifiers, accumulators and connecting valves and pipes need not be purchased. Also floor space used is smaller, and only one foundation is required.
2. Maintenance costs are lower because there are fewer parts to get out of order, and oil is used as a lubricant.
3. Because of these fewer parts in the press, operating efficiency is much higher. Control valves are eliminated, as well as all packings. Piping is almost eliminated also.
4. Only operating cost of the HPM press is electrical power needed to drive the radial pump or pumps. Pressure losses are nearly eliminated thru reduction of pipe lines and valves.

Among the additional advantages mentioned are:—the entire press operation is controlled from one hand lever. The press is closed rapidly by gravity and the press cylinder is maintained full of oil during the closing movement by the HPM patented surge valve, thus permitting high speed closing. The presure stroke follows up automatically with no appreciable time lag because the cylinder is already full of oil. This permits rapid control for planishing operations.

FOR REMOVING BROKEN TAPS

Quickly—
Insert WALTON Tap Extractor and back out broken piece. No annealing—no drilling.

Easily—
Tap Extractor and Tap Wrench are only tools needed.

Safely—
Threads are not damaged. Not necessary to tap oversize after broken tap is removed.

Folder 131 gives complete details.

THE WALTON CO.
95 ALLYN ST., HARTFORD, CONN.

NEW LOW COST
DRILL GRINDER

Anyone can do expert drill grinding with this simple-to-use drill grinding attachment—fits on any bench grinder—saves buying new twist drills—saves time and materials that dull bits waste. Grinds bits from 3/16 to 1¼. Write for FREE literature.

T & H MFG. CO.
911 E. 31 St.
Kansas City, Mo.

Salesmen

After victory has been won, it will be vitally important for firms to have efficient staffs of salesmen to help cushion any post-war slump in sales.

In order to have this staff available when it may be so badly needed, it is of course necessary to retain these men in employment now.

But now when sales may be the least of any company's worries, executives might wonder what to do with sales talent at present. An answer is simply to train such men sales engineers and have them help the war effort along these lines:

Aid war production manufacturers in getting maximum production out of old machine tools while awaiting deliveries of new ones.

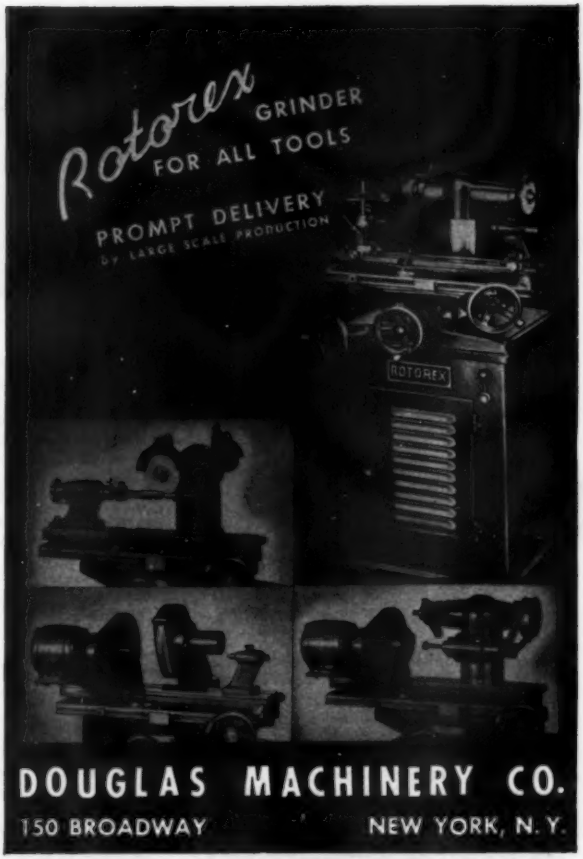
Gather and distribute information as to just what machine tools are needed by war production manufacturers.

Help contractors locate existing machine tool facilities.

Aid the government in estimating machine tool needs for war production programs.

These sales engineers should interpret for employers, the needs of present customers doing war production work. How many of any particular machine tools will they need to do the work for which they contracted? How should these machine tools be equipped for these new jobs? And just when must they be delivered?

After the war when sales will be so vitally needed, these men will be able to go out and show prospective buyers that new machine tools installed on his floor will pay dividends by saving time and cutting costs. They will be able to contrast costs of operation with and without the new machines.



METAL DUPLICATING

Without Dies

Users of Di-Acro Precision Machines—Shears, Brakes, Benders—are constantly showing us new time-saving, cost cutting applications, in experimental work, for making small quantities of parts—or even production runs. They often save expense and delay of making dies, or parts of progressive die sets. They do many things dies cannot do.

Photo (courtesy Minneapolis-Honeywell) shows Di Acro Shear No. 1, which squares up stampings, cuts strips, makes slits or notches. All work accurate to .001".

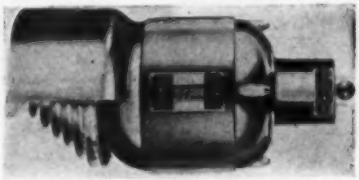
Write for Catalog

O'NEIL-IRWIN MFG. CO.

314-8th Ave. S., Minneapolis, Minn.

Frayco Electric Motors

Fray Machine Tool Co., Glendale, Calif., which has been building all the motors for its own products for several



years, has established the Frayco Electric Motors Co., for the exclusive manufacture of a complete line of motors from 1/3 to 7½ hp. This company will specialize in the production of motors with special end bells, for manufacturers of machine tools and other equipment on which they wish to streamline the motor into the product.

A new plant has been acquired at 1709 Standard Ave., Glendale, with 15,000 square feet of space. The new Company will be under the management of O. W. Weyman.

2000 ton Heading Press

Hydraulic Heading Presses of 1500 and 2000 tons capacity for cartridge case heading work have been added to the Bliss line which already includes 2800 and 3300 ton hydraulic presses. With this addition, high speed heading presses are available in the mechanical knuckle joint type or the hydraulic design, in tonnages suited for all sizes and types of cases.

These two new sizes are of 4 piece frame construction with side housings keyed to crown and bed and with tie-rods shrunk so that press frame is preloaded. They are entirely self-con-

SAVE TIME when time is short

TOOL POST TURRETS FOR ALL LATHE SIZES

Saves on Setting Up — Saves on Repeat Operations

WRITE

C-W-C CORPORATION

HAWTHORNE, CALIFORNIA

TRICO OILERS

KEEP UP PRODUCTION

Accurate—dependable lubrication . . . no guess-work, bearing failures, idle machines or waste when TRICO OILERS are installed.

WRITE FOR BULLETINS

TRICO FUSE MFG. CO.
MILWAUKEE WIS

CUT SANDING COSTS

MITY-MIDGET

HIGH SPEED

BLOCK SANDER

★ No Vibration
Therefore not fatiguing

★ Non-Stalling
Because of super-speed

★ Fits Any Job
Even fillet work

★ Fast-Easy Loading
Wet or Dry Sanding

The smallest high speed block sander on the market ... flexible, light weight and compact ... cuts labor and abrasive costs 50 to 75% ... perfect for feathering ... adapted to metal, wood and composition surfaces.

Write for Descriptive Folder "MT"

NATIONAL AIR SANDER, INC. ROCKFORD ILLINOIS

FASTER, BETTER, DOWN-HAND WELDING

TURNING A WELDMENT FOR

• Cullen-Friestedt Positioners equipped with a "tailstock," (a free-turning platen mounted on a suitable stand) permits a complete rotation of heavy awkward weldments so that faster, better down-hand welding may be done. "A" shows positioner end of this set-up and "B" the other end showing the tailstock. With push-button switch, the welder has complete control of turning speed and starting and stopping at convenient welding positions.

• Our NEW booklet WP 21 is just off the press giving full information about C-F Positioners in four sizes from 1200 to 14,000 lbs., capacity. Write for it.

CULLEN-FRIESTEDT CO.,
1326 E. 113TH ST. CHICAGO, ILLINOIS

QUEEN CITY GRINDERS

Dependable • Efficient Economical

Consider these facts when buying a grinder—Queen City Grinders are equipped with fully enclosed motors to protect from dust and grit. On the heavier machines, motors of 1750 R.P.M. are used which do not require large diameter wheels in order to secure the proper cutting speed at the periphery of the wheel. All grinders are equipped with carborundum wheels at no extra price. And for economy—you can't beat it. Try one of these grinders for 30 days. If you are not satisfied, return it. We can make reasonable delivery.

QUEEN CITY MACHINE TOOL COMPANY

217 EAST SECOND ST. CINCINNATI, OHIO

tained, being operated by a 75 hp motor on main-drive and a 7½ hp motor on ejector drive. Ejector, placed under loading and unloading stations is of 38 tons capacity. In addition, press is equipped with a 2 station lower dial pneumatically operated and equipped with hydraulic dash pots. Press slide is further equipped with a 2 station punch holder also pneumatically operated. The 2 station lower dial is similar to the dials provided on Bliss knuckle joint presses for cartridge case work.

Press is provided with a fully automatic cycle covering dial, press, punch slide and ejector operation. This automatic operation may be arranged for either 1 or 2 pressings per case by a throw of a small selector switch. Independent pressure control is provided on each individual pressing so that a light pressure may be exerted on first pressing and a heavier pressure on second pressing or any other required combination. With this fully automatic cycle only 1 or 2 operators are required, depending upon facilities for handling.

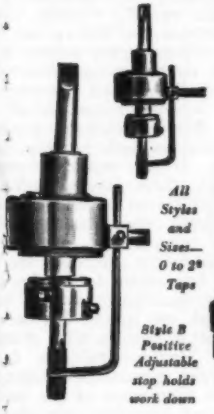
ERRINGTON MECHANICAL LABORATORY

MAIN OFFICE AND WORKS: STATEN ISLAND, NEW YORK

Chicago Office: 6422 N. RICHMOND STREET | New York Office: 200 BROADWAY | Boston Office: 830 OLD SOUTH BLDG.

CLUTCH OR CONE DRIVE

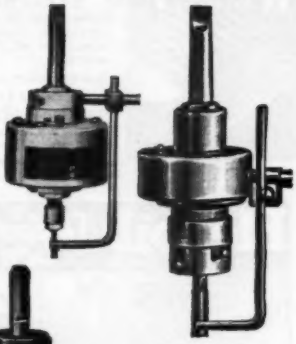
Our High Speed Tappers are Super-Sensitive for Small Tapping



All Styles and Sizes... 0 to 2" Taps

Style B Positive Adjustable stop holds work down

Style D-E, Quick Change Tools



Style C Graduated Adjustable Safety Friction

Shear Cut— High Speed

END MILLS

Shear Cut End Mills are offered in all standard sizes, single and double end.

Write for catalog and prices today.

PROGRESSIVE TOOL & CUTTER CO.

2345 WOLCOTT ST., FERNDALE, MICHIGAN

WIREGRIP
Belt Hooks

Have extra (patented) aligning cards that hold all hooks in position preventing card and waste—every hook is used.

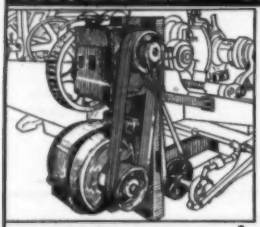
STEELGRIP
Flexible Lacing (the type applied with a hammer) in conversion boxes or long lengths with 2-piece hinged rocker pins.

Immediate Delivery on both types.

Write for Circulars

ARMSTRONG-BRAY & CO.
"The Belt Lacing People"
5364 Northwest Highway, Chicago

FlexoiD Speed Control



PST

FlexoiD
Unit Applied to Cleveland Automatic

BE WISE *Motorize!*
. . . and eliminate outmoded line shafting.
Quickly installed on all types of
LATHES, MILLING MACHINES, etc.
Write or wire collect regarding distributor

The Smith Power Transmission Co.
1545 E 23rd St. Cleveland Oh.

On automatic control after case is loaded, pressing start button causes lower dial to rotate automatically to 180°, moving a new case into press and shifting previous case out and over ejector position. As soon as dial is in its new position, press immediately descends at high speed. Change to pressing speed occurs just before work is contacted, avoiding impact injury to die. Press then continues at pressing speed until a predetermined pressure, adjustable over a wide range, is obtained. When this is reached, press automatically reverses and returns to starting position. If two pressings per case are desired, then punch shifter automatically shifts into second position and press again goes thru pressing cycle with independent pressure regulation. Meanwhile during first pressing, ejector has raised 1 completed case out of die enabling operator to pick case up with air hoist. On second pressing, ejector recedes. This gives ample time for loading and also for oiling die between pressings. Safety interlocks assure alignment of die and punch and prevent improper operation. Operation without work in die is also prevented.

The press is made by E. W. Bliss Co., 53rd St. & 2nd Av., Brooklyn, N. Y.

Buy a Share in America with U. S. War Savings Bonds

CARBIDE TOOLS
HAVE FAR GREATER DEGREE OF SHARPNESS WHEN YOUR DIAMOND WHEELS ARE LUBRICATED WITH
STADOIL DIAMOND LAPPING OIL

The Genuine—gives greater wheel production and much longer wheel and tool life

ORDER thru your Mill or Industrial Supply Jobber and unavailable —then mail your order direct to

Stadoil Manufacturing Company
Dallas, Texas **Los Angeles, California**

War Committees

At the request of Donald Nelson and the War Production Board, labor-management committees have been set up in more than 800 plants to facilitate greater production.

Labor and management each appoint 5 members to the committee, and the committee appoints its own chairman. In 40% of the cases so far, a labor man has been chosen. The labor members of the committee are chosen by the unions or in cases of open shops by direct vote of the workers.

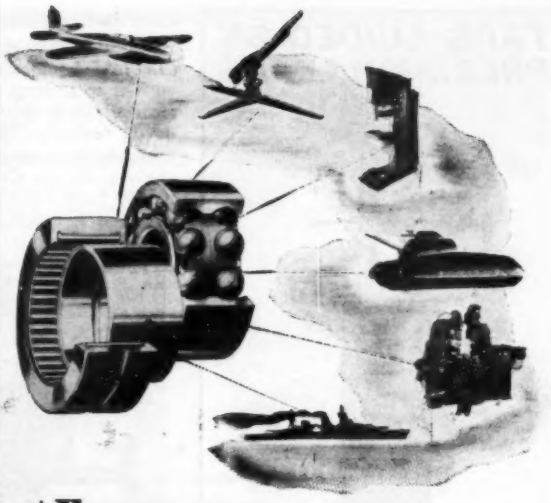
Mr. Nelson said regarding the committees' functions: "Management retains the power of decision. Labor acquires the power of organized suggestion and recommendation."

A few indications of the results of committee work are beginning to come in. The Colt's Patent Firearms Co. says that labor-management co-operation has cut down the number of rejections from 17% to less than 1%. A division of the Am. Rolling Mill Co. states that its blast furnace department topped its best previous month's record by 1000 tons of pig iron and its open-hearth furnace record by 3600 tons of steel.

At Pratt and Whitney the committee has ruled that everyone coming to work late or not reporting must present a reasonable excuse to the committee. Merit and demerit marks will be displayed on bulletin boards and slackers will be named.

At the Harnischfeger Corp. plant thru the committee a blow was struck at one of the ancient causes of "slow-downs." Management stated "No matter how fast you go and no matter how much you increase your production, your piece rates will not be reduced by one cent." Workers need not fear that if they work harder, they will not be paid any more.

Further information on this subject appears in the June issue of Reader's Digest.



★*Fighting on every front*

For greater adaptability to our Nation's implements of war — and the machinery necessary in their production — the size range of McGILL "Solidend" *MULTIROL* Bearings has been increased to accommodate shaft sizes up to 9¼".

BEARING DIVISION

McGILL MANUFACTURING CO.
1700 North Lafayette Street
VALPARAISO, INDIANA

TAPS GUIDED BY PRECISION LEADS

M & L No. 1
PRECISION
TAPPER

Taps class 3 and class 4 gauge fits to Army and Navy specifications ON A PRODUCTION BASIS. Leads furnished for right or left hand threads, 13 threads to 120 threads per inch. Capacity ½" including ⅛" pipe threads—four speeds 95 to 395 RPM. Has dial indicator for bottom tapping. Ball bearings throughout. Equipped with coolant pump system. No skilled operators necessary—sensitive touch—minimizes 'rejects'. Prompt delivery.

POSITIVE OFFSET BORING HEAD

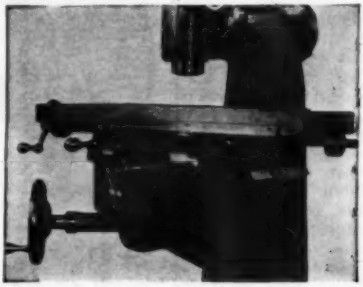
No dial used—measurements taken across two hardened buttons—no chance of error—capacity up to 15" —O.D. diameter 4-7/16" overall length without shank 3-11/16"—boring bar hole 1". Shank sizes B&S No. 9, 10, 11, 12, Morse No. 4 and 5. Accuracy assured—takes guesswork out of your readings.

Immediate Delivery—Satisfaction guaranteed

BRAND TOOL & SUPPLY CO.
(formerly Pacific Tool & Supply Co.)
344 N. Vermont Ave. Los Angeles, Cal.

Index Mill Refinements

Blank & Buxton Machine Co., Jackson, Mich., announce a change in the vernier mountings on Index Mills. Instead of being mounted straight up and down, requiring the operator to stoop to read, they are now mounted on an angle as shown. Cross vernier has been moved from front of knee to the back, where it is much more easily read.



Another recently added feature is power feed to spindle as shown in top view of head. This is an "extra," made available in answer to numerous requests from users who have been using the machine for precision boring on jigs, fixtures and intricate small parts. An area 8"x16" can be milled, drilled and bored at one setting

PUT NEW LIFE INTO OLD TOOLS

★Efficiency equal to many dollars' worth of new machine tools results from replacement of old line shaft equipment with Modern Motor Drives. Users report valuable savings in time, power, floor space and operating cost. For lathes, shapers, mills, drills, planers, punch presses, grinders and hacksaws.

Cast Iron Sheaves

New improved Modern Motor Drives now have cast iron sheaves and extra belting as standard.

Write for complete details today.

MODERN MOTOR DRIVES, INC.
ELKHART, INDIANA

Some dealer territory still available—Write

WAR PLANTS

Steel Boxes for Your Production Needs

SHOP BOXES—Straight Side

No. 401—10"x16"x6"—18 Gauge—**$ .85 ea.**
No. 402—12"x18"x8"—16 Gauge—**$1.10 ea.**

A straight side shop box with rigid handle and hook hole each end. Excellent for shop use where stacking feature is not required.

STACKING BOXES

No. 601— 10"x16"x6"—18 Gauge —**$ .95 ea.**
No. 602— 12"x18"x8"—16 Gauge —**$1.25 ea.**

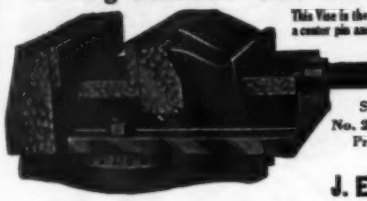
An ideal all-purpose shop box. Sturdy all-welded construction. Heavy skids act as a positive stacking lock and re-inforce box at point of maximum wear.

PRICES F.O.B. FACTORY, PHILADELPHIA—ANY QUANTITY!

ORDER TODAY—WIRE WRITE OR PHONE—PROMPT SHIPMENT

AMERICAN METAL WORKS, INC.
1518 GERMANTOWN AVE., PHILADELPHIA, PA.

Milling Machine Vise with Graduated Swivel Base



This Vise is the same as the Drill Press Vise with graduated swivel base, held in place by a center pin and two bolts. The tongue in center of base can be of any size desired.

Size — Net Price

No. 10—6" jaws, 1½" deep, opens 5"....$38.00
Pressure between jaws, with handle furnished 2400 lb. Net Weight 45 lbs.

Size — Net Price

No. 20—10 in. jaws, 2¼" deep, opens 8½"....$52.00
Pressure between jaws, with handle furnished 4000 lbs. Net Weight 120 lbs.

J. E. Plunket Machine Co., 1821 W. LAKE ST. CHICAGO, ILL.

Power feed to the table is now available as an "extra," since the machine is now being used extensively for production of munition parts. Altho not classed as a heavy duty machine, neither can it be placed in the ordinary small class. It is designed in proportion to the job it is intended to do and is rugged for that sort of work.

Spindle runs in super precision preloaded ball bearings, packed in special grease and is guaranteed for one year under ordinary usage without any further attention. No. 9 Brown & Sharpe taper is standard in spindle and machine is recommended for end mills up to ⅝" in tool steel. However, machines are being used on many jobs with larger cutters. Quill movement to spindle 3¼" with power feed optional. Head swivels 90° either way. Working surface of table is 8x22", overall length 30"; spindle speeds, standard are 6, 180 to 2400, rpm; spindle speeds special, 12, 120 to 3700 rpm.

Two Houghton Catalogs

A 32 page booklet Houghton Products for the Metal Industries has just been issued by E. F. Houghton & Co., 303 W. Lehigh Av., Philadelphia. It describes their cutting bases and oils for small arms production, coolants, cleaning liquids, rust preventives, heat treating quenching oils for shell manufacturing and medium calibre guns, natural hardening salts, high speed steel salts, lubricants, etc.

The second booklet, 16 pages, goes into further detail concerning their liquid salt baths and Perliton liquid carburizer.

Portman Grinder Bulletin

An attractive 6 page bulletin has been issued by Portman Machine Tool Co., Mt. Vernon, N. Y. describing their new vertical rotary surface grinder. Capacity for any size work is 14" in diameter or any group of parts occupying space 12" in diameter and 9" high.

SHELDON
Back Geared Screw Cutting PRECISION LATHES

A complete line of full sized, full weight 10", 11" and 12" Precision Lathes . . . bench, floor and pedestal types built to industrial machine tool standards and specifications. Rigid (heavily braced, semi-steel beds with hand scraped ways —2 "V"—ways and 2 Flat Ways. Large hardened steel spindles, ground all over and individually fitted into hand scraped bearings. Each lathe has a full complement of attachments and accessories. Each model gives more lathe per dollar.

See the SHELDON before you buy.

SHELDON MACHINE CO.
4242 No. Knox Ave., Chicago, U.S.A.

Care of Gage Blocks

A new 4-page booklet—"The Care of Gage Blocks" reveals up-to-date methods of increasing the usefulness and life of gage blocks. During the present shortages of gages and precision tools, every toolmaker and mechanic who works with precision length standards can gain helpful information from this study. Copies are available from the George Scherr Co., 122 Lafayette St., New York.

Lock Nut Booklet

A comprehensive folder on An-cor-lox Lock Nuts is offered by An-cor-lox Div., Laminated Shim Co., Inc., 86 Union St., Glenbrook, Conn.

The folder contains much diagrammatic, photographic and factual matter on An-cor-lox styles, materials, designs and finishes; application instructions; and suggestions for parts conversion to the An-cor-lox function.

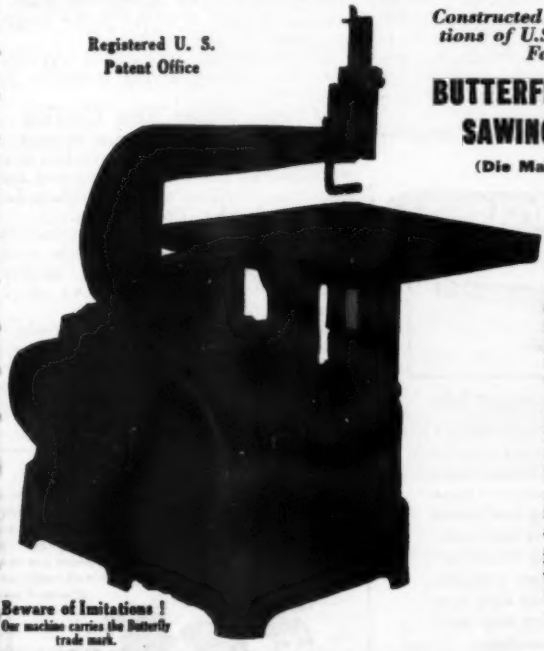
MODEL NO. 16 "SPECIAL"

Registered U. S. Patent Office

Constructed as per Specifications of U.S. Naval Aircraft Factories.

BUTTERFLY FILING and SAWING MACHINE

(Die Making Machine)



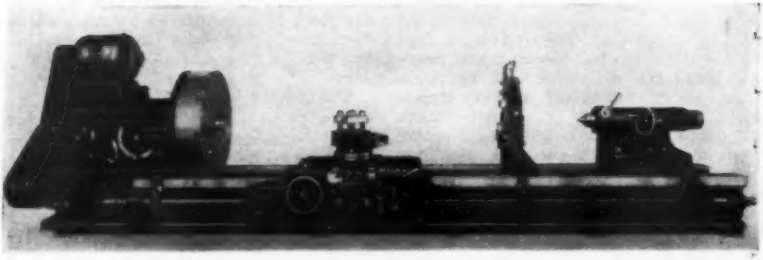
This is a very heavy, powerful machine and is designed for extra heavy filing and sawing, but it performs small work just as well. This type of machine is usually adopted in Ammunition Plants, Airplane Factories and machine shops where heavy and precision filing and sawing is desired. We also manufacture smaller models—Model D-10" Table; Model No. L-12" Table.

Beware of Imitations! Our machine carries the Butterfly trade mark.

HARVEY MANUFACTURING CORP.

161 GRAND ST., Phone CAnal 6-5170 NEW YORK

Simmons Lathes



Simmons Machine Tool Corp., 1725 N. Broadway, Albany, N. Y. has recently improved the design of their 48 and 54" heavy duty lathes. Any length bed can be furnished. Headstock is said to be of simplified design to provide required range and number of spindle speeds with minimum of wearing parts.

Either 4 or 6 speed changes are provided to the internal face-plate thru sliding spur tooth gears and one heavy jaw clutch. Taper attachment gives a maximum taper of 5" per ft for lengths up to 48" at one setting.

A new 8 page circular is available from the makers giving complete information.

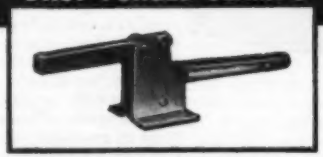
Cramp Issues New Catalog

An engineering reference catalog of brass, bronze and iron alloys has been published by the Cramp Brass and Iron Foundries Division of The Baldwin Locomotive Works, Philadelphia.

Contents include details concerning P-M-G, a silicate bronze made without tin; and the composition, application and physical properties of 31 other alloys.

The book pictures products made of Cramp alloys, gives a list of Cramp brass and iron products, describes the effects of various elements on iron and discusses terms used in materials testing.

DROP FORGED CLAMPS



Extra Strong—Longer Life

Products Engineering Company's quick acting jig clamps are the only drop forged clamps available—they're stronger—have exceptional opening and closing speed and a positive lock impervious to pressure and vibrations—it pays to specify them. Available in many models and sizes from midget to 6" clamping bars. Send today for file size catalog.

PRODUCTS ENGINEERING CO.
700 E. FLORENCE AVE., LOS ANGELES, CALIF.

Vernon
6" UNIVERSAL INDEX CENTERS

Head swivels and locks from 10° below horizontal to 10° past perpendicular. Spindle taper #9B&S. The 3 index plates provided will divide all numbers to 50 and all even numbers to 100 (except 96T).

Write for bulletin.

MACHINERY MANUFACTURING COMPANY
Vernon Line of HORIZONTAL MILLS, VERTICAL MILLS and JIG BORERS, SHAPERS and GRINDERS

Silver

It is possible to fabricate parts made from silver and silver alloys in much the same way that aluminum and brass are worked, namely by rolling, drawing, stamping, spinning, and the like, as well as by the various machining processes in which the metal is cut by conventional tools.

Welding can also be done, and, of course, brazing and silver soldering are accomplished with relative ease. Since oxidation does not take place readily up to the melting point, it is even possible to use the gas-air blow pipe if a small amount of flux be used.

Castings in silver can be made readily by the following means:—A pattern or model is made from wax and to it are attached sprues of the same material. Then a mixture of plaster of Paris, ground silica and water is cast around the pattern and is allowed to set until the mold becomes hardened.

A recess is then cut in such a way that it connects with the holes formed by the sprues, after which the wax is run out and the molten silver or silver alloy is run into the cavity which, has the shape of the pattern.

Flow of metal is facilitated by evacuating the cavity or by applying pressure to the molten alloy either by centrifugal means or by air pressure. The mold is broken to remove the casting.

If several identical castings are required, the wax patterns can be duplicated in any desired quantity in a metal mold made for the purpose. Articles weighing up to 2 oz. are said to be made by this method in commercial quantities, for various industrial applications.

FAST PRODUCTION REQUIRES AN EFFECTIVE COOLANT SUPPLY FOR YOUR HARD-PRESSED MACHINES

Depend on Brown & Sharpe Pumps

Geared — Vane — Centrifugal

Write for Catalog showing a wide range of sizes for various applications.

BROWN & SHARPE MFG. CO.
Providence, R. I., U. S. A.

B·S

BROWN & SHARPE PUMPS

New Target for Industry:

More Dollars per Man per Month in the PAY-ROLL WAR SAVINGS PLAN

TO WIN THIS WAR, more and more billions are needed and needed fast—AT LEAST A BILLION DOLLARS A MONTH IN WAR BOND SALES ALONE!

This means a *minimum* of 10 percent of the gross pay roll invested in War Bonds in every plant, office, firm, and factory in the land.

Best and quickest way to raise this money—AND at the same time to "brake" inflation—is by stepping up the Pay-Roll War Savings Plan, having every company offer every worker the chance to buy MORE BONDS.

If your firm *has* already installed the Plan, *now is the time*—

1. To secure wider employee participation.
2. To encourage employees to increase the amount of their allotments for Bonds, to an average of at least 10 percent of earnings.

If your firm *has not* already installed the Pay-Roll War Savings Plan, *now is the time to do so.* For full details, plus samples of result-getting literature and promotional helps, write, wire, or phone: War Savings Staff, Section E, Treasury Department, 709 Twelfth Street NW., Washington, D. C.

U. S. War Savings Bonds

This Space is a Contribution to Victory by

Hitchcock Publishing Co., 508 S. Dearborn St., Chicago, Ill.

Power

New airplane engines which once consumed great quantities of aviation gasoline but did no useful work during breaking-in runs now have been harnessed to produce power for machine tools and lights, according to R. H. Wright, Westinghouse engineer.

The new power-producing method has been achieved by harnessing the airplane engines to ordinary generators of the type long used in small Diesel-electric power plants. Westinghouse already has supplied one large airplane engine manufacturer with 16 of these generators.

By installing generators in test cells, each aircraft engine can produce about 2,000 kilowatt-hours during its test runs. Generators now in use in one factory will produce each month more than 3,000,000 kilowatts-hours, worth about $24,000.

That much electricity is enough to supply the entire factory—driving all the machinery used to manufacture airplane engines, as well as supply factory lights. In less than 2½ years, the generators will pay for their cost.

The generators can also operate as motors to crank the stiff, new engines for their first trial run. Then, after the engines gain speed under their own power, the electrical machines automatically become generators, producing power instead of using it. By measuring the amount of electricity generated, engineers can tell whether the engine is running properly. Such accurate checks are not possible when the engines drive propellers in test cells not equipped with generators.

Test cells that use generators can be built smaller and less expensively. Propellers make so much noise their cells must be built larger and with sound baffles to keep them from being a civic noise nuisance. Otherwise, a battery of aircraft test cells would create the incessant sound of a low-flying squadron of bombing planes.

The Jackson No. 2 Verticle Milling Machine, ruggedly built of quality materials, will prove indispensable for Tool Room or Production applications. 5 speed V-belt drive, sturdy 4¼" quill and ¾" spindle capacity 8" x 32" table.

JACKSON
MACHINE & TOOL COMPANY SALES DIVISION
956 Roberts St. Jackson, Michigan

Artus Spacers

Made of Synthetic Resin in thicknesses from .001" —.020". Each thickness can be identified by its color.

IMMEDIATE DELIVERY

Send for detailed circular and price list.

Industrial Products Suppliers,
2 Broadway, New York City

BREMIL MFG. COMPANY

1700 Pitts. Ave., Erie, Pa.

ALL-ALLOY compound lever strap cutter. Cuts 1½" strap with one stroke.

YOST DRILL PRESS VISE

This new Yost vise has been designed expressly for use on drill press operations. Does away with special and costly jig fixtures.

Offered in two sizes.

Vise No.	Width of Jaw, Inches	Opens Inches	Weight Pounds
1D	3½	3½	12½
2D	5	5½	23

Do you need a vise of ANY type?

Write today for bulletins on the extensive Yost line

YOST MFG. COMPANY
1335 SO. MAIN ST.
MEADVILLE, PENNSYLVANIA

Coolant Tank with Baffle

A tank with built-in baffle is now offered by Brady-Penrod, Inc., Muncie, Ind., for use with their new Model 600 Replacement Coolant Pump.

The tank is 12x12" in size, made of heavy galvanized sheet iron painted machinery gray outside. A baffle separator collects heavy chips of metal carried by the returning coolant fluid.

Pump and tank assembly can be installed by any shop man and may be used with any type of coolant in general use, on any type of machine, for single or multiple installations. It is easily transferred from one machine to another when a job is finished. The pump, with its ⅛ hp NEMA motor, handles up to 10 spindles or cutting tools, providing a flow of coolant that can be regulated from a single drop to a steady flow of 1200 gallons per hour.

Five other models of coolant and circulatory pumps designed by Francis E. Brady, Jr., are used as standard equipment by machine tool manufacturers.

OPTICAL COMPARATORS

* * *

MILLING MACHINES

* * *

ROTARY SURFACE GRINDERS

Write

PORTMAN MACHINE TOOL CO.
Mount Vernon, N. Y.

Productive Lighting Manual

A new lighting manual to meet the need for up-to-minute data on the use of lighting as a production tool in solving problems of production, rejects, employee fatigue, accidents and morale, greater utilization of floor area, windowless plants, 24-hour operation, etc. is announced by the Benjamin Electric Mfg. Co., Des Plaines, Ill.

Entitled "Benjamin Specifications for Productive Lighting in War Plants," it is designed to provide executives, plant men, architects, etc. with latest information on best methods of using lighting economically and efficiently as part of the war production drive.

Main section of the Guide is devoted to solutions for the 21 lighting problems most commonly encountered in plants converting to war production. These solutions are written in non-technical, easily understood language and are illustrated by means of diagrams and layouts, making it easy to put the solutions to immediate use.

DUBLIFE
PLUG GAGES LAST TWICE AS LONG AS ORDINARY GAGES
"UPPCO FINISH"
ASSURES EXTREME HARDNESS AND ACCURACY
The handle is made of hexagon material with bronze tapered collet which locks around the plug as it is driven into the handle. The plugs are reversible, so that when one end is worn out the other end may be used, thus giving double life. 30,000 gages in stock ranging from .030" to 1".
Catalog showing DUBLIFE and other gages of American Gage design will be sent on request.
ORIGINATORS and exclusive manufactures of DUBLIFE GAGES and UPPCO FINISH
UNITED PRECISION PRODUCTS CO.
4618 W. HURON ST., CHICAGO, ILL.

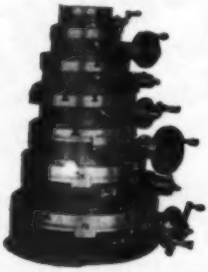
"ALNOR" Velometer
An All Purpose Air Velocity Meter
—Instantaneous, Direct Reading.

Measures total and static pressures as well as velocities.

write for catalog

ILLINOIS Testing Laboratories, Inc.
150 W. Hubbard, Chicago

TROYKE ROTARY TABLES



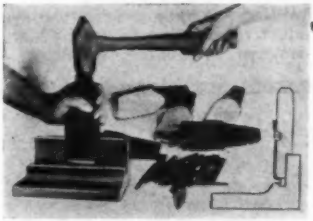
Sizes 9", 12", 15", 18", 21", 25"

Ask your dealer or write us for eight page catalog.

ALFRED A. TROYKE
4422 Appleton St., Cincinnati, O.

Parts Difficult to Mark

For stamping numbers and letters into "hard-to-reach" positions on castings, forgings and machined parts a new specially constructed Hercules Holder and type are offered by the Acromark Corporation, 913 Morrell St., Elizabeth, N. J.



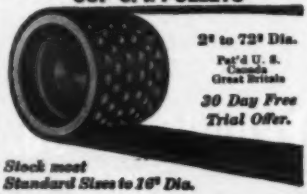
The extra body of Hercules style type gives the type sufficient strength to permit required length necessary to reach into sunken panels, grooves or depressions and cavities. For additional support, the holder is designed to extend to the limits that the marking position allows and the spring pressure clip firmly holds type in position.

Hydro-Whirl Magnesium Booth

Manufacturers working with magnesium should be interested in the Hydro-Whirl Magnesium Booth made by Industrial Sheet Metal Works, Detroit.

Instead of steel, the bench-high grating of compartment where the work is done is made of hardwood, which will not produce sparks if struck with

NO BELT SLIPS WITH VACUUM CUP C. I. PULLEYS



2" to 72" Dia.
Pat'd U. S. Canada Great Britain
30 Day Free Trial Offer.
Stock most Standard Sizes to 16" Dia.

Shut Off Expense Caused by Slippage You Save Money on Every Installation

NEW LOW PRICED PRODUCTION LINE
SOME OF SIZES LISTED BELOW Send for List—On the Shelf

Dia.	Face	Price	Dia.	Face	Price
2	"x2½"	$1.25	4	"x3½"	$2.85
2½	"x2½"	1.45	4½	"x3½"	3.95
3	"x3½"	2.25	5	"x4½"	4.35
3½	"x3½"	2.55	6	"x5"	4.75

Increase your Production

We supply Fractional Dia. and Face Pulleys—From large casting stock.

VACUUM CUP METAL PULLEY CO., INC.
12535 Grand River Ave., Detroit, Mich.

EFFICIENCY — SPEED — ACCURACY
ARE ASSURED WITH
OLIVER DIE MAKING MACHINES

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Model S-1

You can speed output on Dies —Gages—Cams—Templates— Experimental Work— You can use less skilled operators.

* * * * *

Large Savings—Small Investment.

Send for Bulletin Today.

We also build:
Drill Grinders—
Cutter Grinders—
Face Mill Grinders—
Tool Bit Grinders

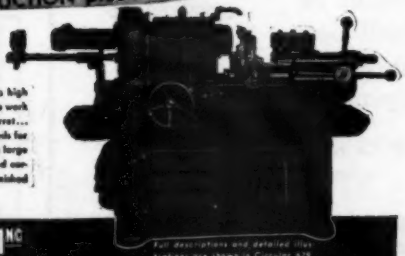
OLIVER INSTRUMENT CO., 1408 Maumee Street, East, Adrian, Michigan

The MOREY 2G
Back-Geared
TURRET LATHE
Timken Bearing
Self-Locking Turret—Infinite Spindle Speeds

CAPACITY
Automatic Chuck (round) 1"
Swing over cross slide 6"
Swing over bed 14"

Features HIGH SPEED PRODUCTION plus OPERATING ECONOMY

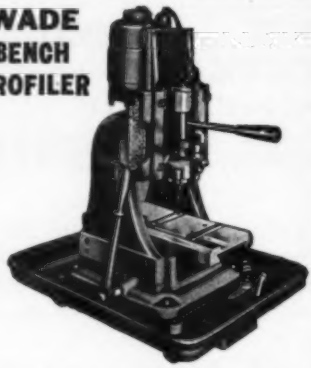
The MOREY 2G Timken Bearing Turret Lathe insures today's high speed production with a minimum of operating expense. More work at less cost with these money saving features: Self-Locking Turret... Vibrationless precision with an infinite variety of spindle speeds for every job . . . Back Gears instantly thrown in through extra large Twin Disc Clutch . . . takes full advantage of high speed and carbide tools. Modern design for modern production. Can be furnished with tooling.



Full descriptions and detailed illustrations are shown in Circular 629. Ask for it TODAY!

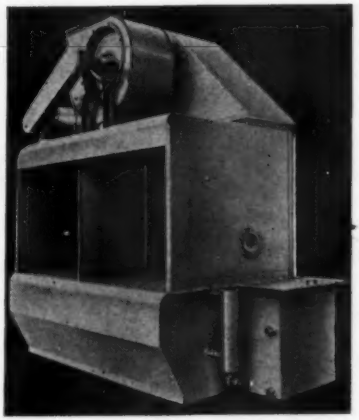
MOREY MACHINERY CO., INC
413 BROOME STREET • NEW YORK, N. Y.

WADE BENCH PROFILER



For rapid production in .ecessing and slotting operations.

WADE TOOL CO.
WALTHAM, 1-1 MASS.
ALSO WADE BENCH LATHES AND HAND KNURLING TOOLS



a grinding wheel or tool. Thus, the hazard of having sparks ignite the magnesium dust created by the grinding, buffing, or polishing operations performed within the booth is removed and danger of fire is reduced. As an added protection against spark ignition, the booth sections are lined with Masonite.

An automatic control maintains water level at a uniform height in tank below the grating. Thus the tank will never run dry to endanger safety of the operator.

Buy a share in America with United States War Savings Bonds and Stamps

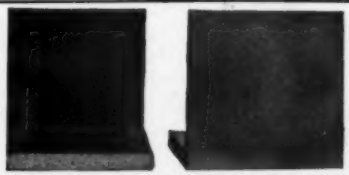
BURKE
MILLING MACHINES
Make Fast Work of Small Jobs

Motor Driven

Timken roller or ball bearings to spindle

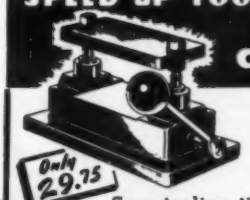
Write today for circulars.

Burke Machine Tool Co.
297 E. 16th St., Conneaut, Ohio



Angle Plates for, Boring Mills, Drills, Grinders, Layout, Inspectors, Surface and Lapping Plates, Prompt Delivery.
TATRA TOOL CO.
16317 Sanford Ave. - Cleveland, O.

SPEED UP TOOLING— CUT COSTS



with the **UNIVERSAL VISE**

Save tooling time. Build your fixtures around a completely pre-designed drill jig body.

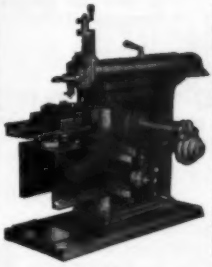
Save production costs. Savings up to 60% in drilling time not uncommon. Lever locks work instantly—holds securely. Throw it back and work is released. No complicated adjustments. Save cost of expensive drill fixtures—just a bushing plate and adaptor needed for each job.

Order today. Please include contract number or priority certificate. *Write for bulletin.*

Mohr Lino-Saw Co.
130 N. Union Ave. Chicago, Ill.

Lewis Semi-Finished 10" SHAPER

Complete with Vise — Prompt Delivery



Perfectly designed, shop tested, trouble-proof construction. Exceptionally efficient. Will stand severest service. Quickly and easily adjusted. LEWIS SHAPER has 10" stroke, 10" longitudinal feed and 7" vertical feed. Complete — including semi-finished castings, necessary materials, blueprints and LEWIS 7" VISE CASTINGS.

Send today for catalog of Lewis Products with complete specifications . . .

LEWIS MACHINE TOOL COMPANY
P.O. Box 116, Sta. A, Dept. Z-19 Los Angeles, Cal.

SIMPLIFIED INTERNAL GRINDING with the MAJESTIC INTERNAL GRINDER

An exceptionally wide range of internal grinding jobs can be handled on the New Majestic Internal Grinder. Its simplicity of design and ease of operation are features of utmost importance in providing maximum grinding output at low cost.

SPECIFICATIONS

Length of table, 48". Swing over table, 10". Travel of cross slide, 2½". Precision dial graduated to .0001". Precision bearing work head. Speeds—100, 225, 350 r.p.m.

Write for complete details contained in New Bulletin

Majestic Tool & Mfg. Co.
2948 E. Woodbridge Detroit, Mich.

DIAMOND ACME TOOLS

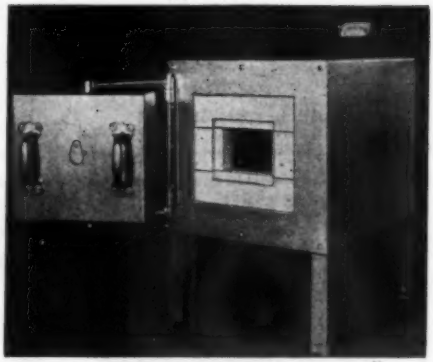
Diamonds vary in quality and it is important to use the proper kind for a given job. "Bargain diamonds" are not an economy.

If you don't know diamonds know your diamond dealer. Our 45 years in this field merits your confidence.

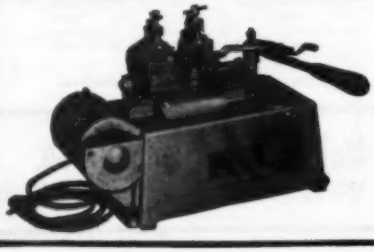
ACME DIAMOND TOOL CO.
15 MAIDEN LANE, NEW YORK, N. Y.

Falcon Electric Muffle Furnace

A new full muffle Falcon electric box type furnace with all refractory hearth is announced by H. O. Swoboda, Inc., 129 13th St., New Brighton, Pa. Designed primarily for fritting and glazing ceramics at temperatures up to 2000°, the new Falcon BWM furnace is also claimed to be highly efficient for heat treating high speed tool steels, hardening, tempering, and many other tool room and laboratory heating applications. Principle advantages are said to include low initial and operating costs, long operating life at maximum temperature and quick heating; maximum temperature is obtained in less than one hour.



A new type of center pivoted door is said to eliminate the mechanism and consequently much of the cost of the standard sliding door besides offering the advantage of always swinging away from the workman thus preventing ex-



BAND SAW WELDERS

The No. 141 Bench Type Metal Working Band Saw Welder is available with or without grinder. Work can be annealed without removing from the Welder. Band saws up to ¾" wide may be welded.

1 KVA—110 Volt—60 Cycle—single phase—5 point heat control—1 point anneal heat—Weight 40 lbs. Let us send you further details.

Mfrs. of complete line of Spot, Butt, Seam, Flash, Projection and Special Welders.

WELDEX INC., 7325 McDONALD AVE., DETROIT, MICH.

AUXILIARY STOCKROOMS

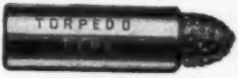
—Wherever You Need Them!

STACKBIN sections will give you a Stockroom wherever you want it—quickly and easily as building a sectional bookcase. These patented sectional storage bins nest together without the use of tools—cost you nothing to build, nothing to move. Find out today how STACKBINS can lower YOUR handling costs.

Write to
STACKBIN CORPORATION,
55 Troy St., Providence, R. I.

STACKBINS
"STACKED AND STILL ACCESSIBLE"

Cut Dressing Costs with WILLEY'S



No resetting required.
Accurate, precision dressing.
For all makes of grinders.
Lower production costs.

Layer upon layer of natural, whole diamonds, in tungsten carbide matrix. Many sharp cutting points in constant contact with grinding wheel during the entire life of the tool. Make comparative tests, for quality and *cost per dressing*. 4 standard sizes. Prompt shipment. Prices include holder. *Order today!* Ask for Bulletin 142, covering Willey's Standard Tungsten Carbide Cutting Tools and Torpedo Type Wheel Dressers.

No.	Usable Contents of the Diamonds		QUANTITY PRICES				Wheel Diameter
	Diameter	Length	1-25	26-50	51-75	76-100	
W-3	1/8	1/8	$11.00	$10.00	$ 9.00	$ 8.00	6 to 12
W-4	1/4	3/8	13.00	12.00	11.00	10.00	12 to 20
W-5	3/8	1/2	15.00	14.00	13.00	12.00	20 to 24
W-6	1/2	1/2	17.00	16.00	15.00	14.00	24 to 42

WILLEY'S CARBIDE TOOL CO.
1344 W. Vernor Highway, Detroit, Michigan

THE BARNES

Motor Driven Precision Cutter Grinding Machine

For precision Grinding Formed Milling Cutters used in the manufacture of rifles, pistols, etc.

General Machinery Corp.
140 Federal St., Boston, Mass.
Telephone Liberty 4826

LUMA

Combination Etchtool — —3— Tools in 1

Luma Marking and Demagnetizing SIMULTANEOUSLY

Writes on hardened steel — demagnetizes at the same time—with carbon point does light spot annealing and soldering jobs. Compact—easy to use—dependable.

Send for details—5-day FREE TRIAL OFFER!

Luma Electric Equipment Co.
Dept. H—Main P. O. Box 132, Toledo, Ohio

posure to the heat of the inner door surface. Other construction features include a full box type muffle and all-refractory hearth, completely surrounded by heating elements which eliminate temperature variations in the hearth chamber. Chamber dimensions are 3¾" high, 5¼" wide and 12" deep.

The furnace shown is arranged for bench mounting, but is also available in floor mounting style. Capacity provided is 3 kw. Furnace can be furnished for 110 or 220 volts, single phase current. It is furnished with indicating pyrometer. Automatic temperature controls are supplied either mounted directly on furnace or for separate mounting. Temperature ranges up to 2300F. can also be provided, with various types of door and hearth construction to serve specific application.

War Paints

Blackout paints are described in a new circular issued by Lasting Products Co., 200 S. Franklintown Rd., Baltimore, Md. According to the makers, one coat covers completely, it is quickly and easily removable, does not crack glass, and renders glass more shatterproof.

A companion light-reflecting white paint is also available for keeping interiors cool and bright when blackout paint is applied.

Another circular from the same firm is available describing their Paint Master's Wrinkle Finish paint, available without priorities in 8 different styles. It is claimed to be an all concealing one coat finish that dries in 5 to 15 minutes.

Why Not Buy The Original Electric Etcher

MARK IRON AND STEEL

THE ETCHOGRAPH WAY

New ELKONITE TIP pencil.
New Baby Grand Model at a lower price.

2,000 in use

BREWSTER - SQUIRES CO.
42 Church St., New York, N. Y.

for HARD, FAST WORKERS

It's a CHALLENGE WORK BENCH

Cast Iron Top . . . Tool Box Shelf . . . Leveling Screws under table . . . Steel Drawer with lock . . . Four Sizes — Three Styles.

Challenge Work Benches are built to remain rigid under heavy pounding, shocks, and pressure. The top is carefully planed with all four sides at exact right angles. Underside is heavily ribbed.

The legs are firmly braced, the braces being high enough to permit the use of a standard lift truck. Write for prices and details; also data on other Challenge Precision Equipment today!

420

THE CHALLENGE MACHINERY CO., GRAND HAVEN, MICHIGAN

BAY STATE Hand Tapper

Necessary in any tool room.

It cuts direct hand tapping labor costs 75% in tool and die rooms and machine shops. Makes quick accurate tapping easy. Assures holes tapped at right angles without the aid of a square. Does away almost entirely with tap breakage, spoiled work and consequent delays. Ready instantly for any hand tapping job from No. 5 to ¾" tap.

PROMPT SHIPMENTS

Manufacturers of PRODUCTO DIE SETS

THE PRODUCTO MACHINE CO.

990 HOUSATONIC AVE. BRIDGEPORT, CONN.

3017 MEDBURY AVE. DETROIT, MICH.

Write for descriptive bulletin 201

A precision POWER FEED INTERNAL GRINDER

THE GRENBY IG-10 INTERNAL GRINDER

- Ex-Cell-O 35,000 RPM Spindle
- Power or Hand Feed
- Four Speed Power Feed Unit
- Precision Motorized Workhead
- Table Travel 10"
- Cross Travel 4"
- Grinding Capacity ⅛" to 3" Holes

SEND FOR THE GRENBY CATALOG

No. IG-10

GRENBY MFG. CO.

PLAINVILLE CONNECTICUT

Preventing Cutting and Welding Fires

The spectacular burning of the Normandie last winter called attention to one of America's greatest industrial fire hazards—blazes starting from cutting and welding. The wide use of welding and oxyacetylene cutting in war production makes this such a frequent hazard.

Portable equipment causes the great majority of these fires, since locations where these operations ordinarily are carried on usually are well protected. These fires from portable equipment may be started by the metals being welded or cut, by the molten slag that blows or drips from the cut, and from sparks that fly from the cut.

Keep in mind that some of these sparks may fly from 25 to 30 feet and that they hold heat for some time. It is unsafe also to use cutting or welding equipment NEAR rooms containing flammable materials, since sparks may fly thru cracks or holes in walls, or flammable vapors may seep into the room where the work is being done.

Floors should be swept perfectly clean before the torch is lighted. Tight metal or asbestos guards should be placed around dangerous material, and particular care should be taken that sparks or molten slag cannot roll underneath, beyond, or oven them. Be sure, however, to use a guard that will not itself burn.

A $500,000 hotel fire in Cincinnati was recently caused by a spark passing thru a pipe that was being burned off near where it ran thru a wall. And when any potentially dangerous work is being done, make sure that sprinkler protection is not turned off and that fire extinguishing equipment is handy.

It is well to have some responsible person in charge who must give his O.K. before any hazardous work is started. He should examine the location where work is being done and see that all necessary precautions are made. Operator should not be permitted to start work until a signed permit has been received.

A minute or two lost in taking proper precautions will delay war production far less than the millions of minutes lost thru a serious fire or explosion.

(From a pamphlet obtainable at 10c each from National Fire Protection Ass'n, 60 Batterymarch St., Boston, Mass.)

PRIORITY IN EXPERIENCE

Special nails, rivets, screws and other cold-forged products made quickly and economically to your order. Facilities include those for swaging, fluting, knurling, milling, pointing, slotting, tapping and finishing. Send for catalog—no obligation. It will acquaint you with the possibilities of our inexpensive and better method. When you order from Hassall you benefit by ninety-two years of experience, embracing three previous national emergencies.

John Hassall, Inc., Clay and Oakland Sts., Brooklyn, N. Y.

DYER

Heavy Duty Spot Welders

Floor models 10 to 35 KVA.

6 point selective switch on all floor models allows for quality welds on various materials. Standard and Underwriters Labeled Machines.

3 point switch on bench models.

Bench models 2½ to 10 KVA.—with or without pedestal.

PROMPT DELIVERY

Few Territories Available.

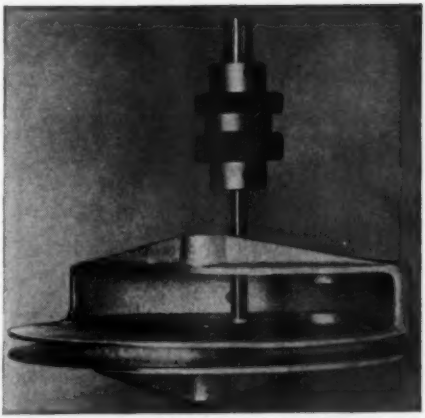
Dyer Welders are available in a wide range of sizes and capacities—air, motor or foot operated, giving maximum production—simplicity of operation—power economy.

300-322 Jackson St. THE TOPEKA FOUNDRY & IRON WORKS CO., Topeka, Kansas

New Type Burring Tool

An entirely new burring tool, said to be effective in removing burrs from inside edges of multi-walled parts is announced by Nobur Mfg. Co., 6156 Santa Monica Blvd., Hollywood, Cal.

According to the manufacturer, the new tool cuts finishing time to a minimum by eliminating slow and costly hand methods of burring. Used in a drill press, lathe or other machine spindle, it is kept in continuous motion while parts are fed to it as fast as operator can handle them. It consists of a cylindrical shaft which pilots in the hole to be de-burred. To one end of the shaft is fastened a knurled collar. This knurled collar is a free-rolling ball bearing unit that can be grasped and held by the hand even while shaft is rotating. By sliding the collar up or down the burring blade may be advanced into cutting position or withdrawn.



It is claimed that the tool can be handled by "green trainees" or women operators with speed and accuracy, and its smooth, clean cutting action will pass critical inspection. Cutting blade can be removed quickly for re-sharpening. All essential parts are case hardened and ground.

The tool is available in 1/16" progressive sizes—from 3/16" to 1". Additional sizes and special tools can be furnished upon application.

"KEEP 'EM ROLLING"
Buy United States War Savings Bonds and Stamps

HOWE-LINDSEY AUTOMATIC SAW SHARPENER

FOR RECONDITIONING

- HACK SAWS
- BAND SAWS
- MEAT SAWS
- METAL SLITTING SAWS, ETC.

Designed to sharpen hack saw blades, metal saw blades, circular saws, metal slitting saws and milling cutters up 5/16" face. *Write for circular.*

HOWE AND SON, INC.
HINSDALE, N. H.

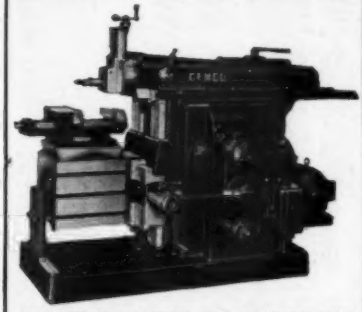
Accurate Hole Transfer Made Easy With NIELSEN TRANSFER SCREWS

Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods. 7 sizes U.S.S.—Inexpensive—last for years.

Write for Circular

NIELSEN TOOL & DIE COMPANY
1859 Gardner Ave.
Berkley, Mich.

CEMCO MULTI-PURPOSE SHAPERS



PROMOTE--INCREASED PRODUCTION

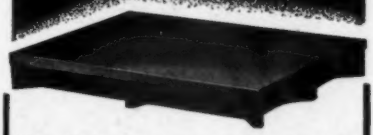
•

PLAIN, PRODUCTION & UNIVERSAL TYPES

GENERAL ENGINEERING & MFG. COMPANY

ST. LOUIS MISSOURI

★ ACCURATE BENCH PLATES



Made of high quality, stress annealed, semi-steel type grey iron. Rigid construction insures solidity and maintenance of accuracy under constant use. Thick top surface permits drilling, tapping to mount tool details.

Stock size 10 x 14 x 2. Wt. approx. 31 lbs. Inquiries solicited on other sizes.

LAPPING PLATES

1/16" Grooves 1/2" apart run length and width of surface. Held to within 1/10,000 for flatness. Size 10x14x2. Prompt deliveries. *Write for details.*

LOMBARD GOVERNOR CORPORATION

400 MAIN ST. ASHLAND, MASS. U. S. A.

POWER HACK SAW

The Keller No. 2 Hy-Duty Model Saw is unexcelled for production work.

This saw has a capacity of 6¾" x 6¾". As standard equipment this saw is furnished with a special feed control for cutting light and heavy material, coolant pump, swivel jaw vise, two speeds and is motor driven.

Write for folder.

SHAPE-RITE SHAPER

This 8" stroke Hy-Duty Model Shaper is most adaptable for tool rooms, gage departments, and instrument manufacturing in defense plants for precision work.

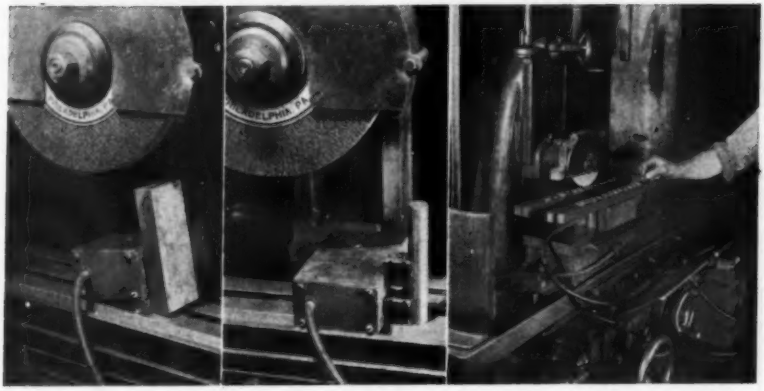
Furnished now with plain or swivel table and swivel base and swivel jaw vise as standard equipment.

For further details, see your dealer or write us for folders on both of the above machines.

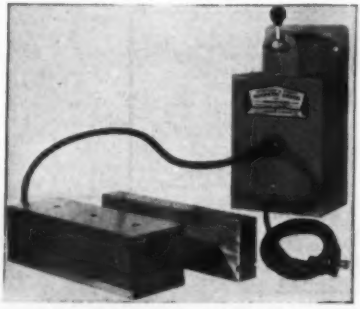
SALES SERVICE & MFG. CO.

473 N. CLEVELAND ST. PAUL, MINN.

Magnetic Chuck-Demagnetizer



A decided innovation in magnetic chucks is sponsored by the Anderson & Brown Sales Agency, 2036 East 23d St., Cleveland, Ohio.



Small for its magnetic holding capacity, the chuck is readily portable and may be moved from machine to machine as needed. It may also be used as a portable demagnetizer. A very compact rectifier is included as part of the chuck ensemble, so the unit supplies its own d-c current, energized from any convenient a-c outlet.

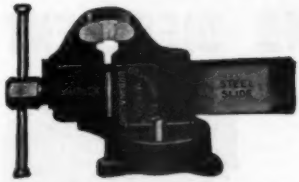
The chuck may be used in any required way on the table of any grinder, milling machine, shaper or other machine tool. Its versatility in unusual setups is revealed by the accompanying illustrations of a few typical uses.

DESMOND
GRINDING WHEEL
DRESSERS and CUTTERS

We can supply you with the proper Dressers and Cutters for all of your grinding wheels.

Ask for copy of our catalog and name of your nearest dealer.

SIMPLEX
Steel Slide
VISES

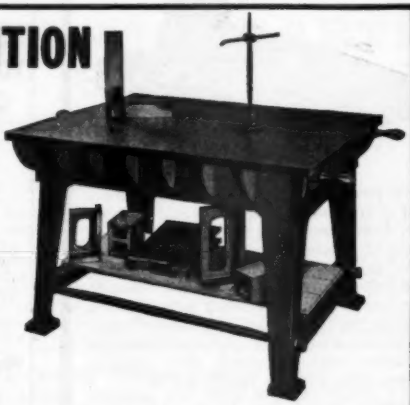


A full line of Machinists' Filers, Welders, Production and Drill Press and Milling Machine Vises.

Let us send you our vise catalog and name of your nearest dealer.

The DESMOND-STEPHAN MFG. CO., Urbana, Ohio

A USEFUL ADDITION



Modern precision machine shops and inspection departments will find this sturdy 36"x 48" MILWAUKEE SURFACE PLATE a valuable addition. Constructed of semi-steel, accurately machined, securely mounted on cast legs which are machined and provided with SAE adjusting screws for perfect alignment. Height from floor to top of plate 30". Can also be had in 38". Shipping weight 1200 lbs.

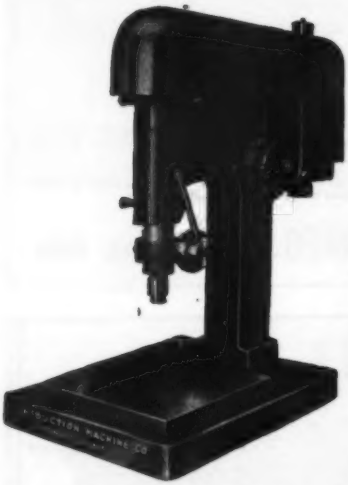
We also manufacture angles and parallels as shown underneath surface plate.

We also make larger and smaller plates either with planed or scraped surfaces, whichever is desired. *Write today for full information.*

J. C. BUSCH COMPANY ENGINEERS AND MACHINISTS SINCE 1907

165 SO. BARCLAY ST., MILWAUKEE, WIS.

RUGGED! NEW - AND DIFFERENT



This new Type 25 Bench Drill is a marvel of streamlined efficiency and simplicity. Note carefully the following features: Rugged Strength, base and column are only two castings. Direct Drive, with single belt from motor to spindle. Totally Enclosed, with no moving part exposed except the drill chuck. A versatile machine for a variety of light work due to an infinite range of speeds thru variable speed drive 1500 to 10,000 R.P.M.

Write for detailed information.

PRODUCTION MACHINE CO.
GREENFIELD, MASS.

The makers attribute its magnetic action to "Magnetic Body Flow" rather than to skin or surface magnetism. As they explain it, the chuck generates a powerful magnetic flux which traverses the work, flows thru the steel parallels and returns to the chuck via the machine table. On some jobs, of course, parallels are not required to support the work and the chuck itself may be used to hold the work at any required position on the table. Parallels can be built up to handle work with irregular bases. Vertical work is set up as easily as horizontal.

The rectifier converts 110 volt a-c supply to 6 volts d-c for energizing the chuck. The makers emphasize that this low voltage is a safety factor, eliminating inductive kick and consequent chance of damage to chuck windings or insulation. The chucks may be used for wet or dry grinding. When used as a demagnetizer, a-c current is sent thru the chuck windings.

Appropriate sizes of chucks are available for all sizes of grinders.

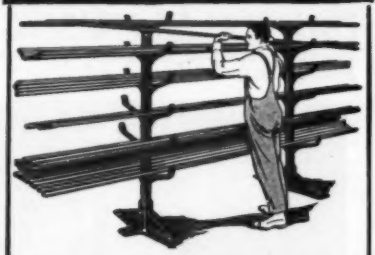
Some choice territories are open for dealer representation.

SPEED-UP YOUR RIVETING OPERATIONS

THE GRANT MFG. & MACHINE CO.
C. E. Station,
Bridgeport, Conn.

A great help in War Production, these **Grant** Riveters are available in Noiseless Spinning and Vibrating Hammer types, also Vertical and Horizontal Multiple Spindle Spinning Machines. *Information? Write!*

A TIME SAVER



The BROWN SECTIONAL RACK

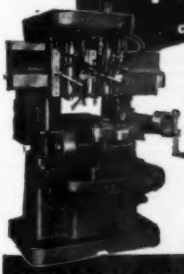
saves the time wasted end-hauling stock from the old-style, closed-side rack and quickens the selection of sizes by greater visibility. Built of standard metal sections: can be expanded for changes in stock or growth of business. Made in 5 styles: can't burn, depreciation practically nil.

SEND FOR BULLETIN No. 26-B

BROWN ENGINEERING CO. 126 N. THIRD ST. READING PA

Preloaded Precision Bearings for Spindles

MOREY 12M HIGH-SPEED VERTICAL PROFILER and MILLER



Two spindle or single spindle

Speed and more speed in the production of interchangeable parts requiring milling of any contour or outline is yours in the MOREY 12M. Provision for increased clearance between spindles and table.

Ask for Bulletin 680-A

MOREY MACHINERY CO., INC.
410 Broome Street New York, N. Y.

MODEL 25

MARK YOUR PARTS

Permanently

PART NUMBERS CATALOG NUMBERS,
HEAT NUMBERS, SERIAL NUMBERS,
PATENT NUMBERS
MANUFACTURER—INSTRUCTION DATA—INSPECTION

Positive, Permanent marking on your products assist prospects to order. Makes it easier to buy—new, repeats and repairs. Gives you a definite record of pertinent data on each part produced.

The Pneumatic marking machine illustrated is our HI-DUTY model 25 general purpose tool for short runs or production work. It operates from your shop air line and is one of numerous models built to produce neat, permanent markings quickly on metal fabrications.

We will be happy to make specific recommendations upon receipt of samples or prints of parts to be marked, showing approximate lettering, its location on the part, with required hourly production.

MARKED PARTS ADVERTISE
IN THE RIGHT PLACE, AT THE RIGHT TIME.

Send for complete catalog of our full line of marking Tools, Machinery and Equipment.

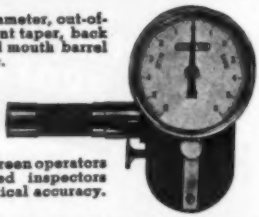
GEO. T. SCHMIDT, Inc.

1802 Belle Plaine Ave., Chicago, Ill.

To fractions of .0001" it tells the "hole" story

COMTORPLUG

Shows diameter, out-of-round, front taper, back taper, bell mouth barrel shape, etc.



Sizes: ½" to 7" dia. and larger

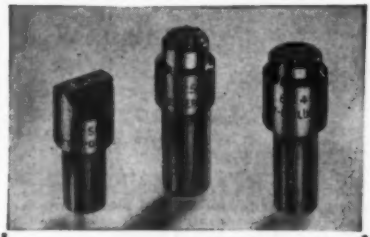
Used by green operators and skilled inspectors with identical accuracy.

Comtorplug is a unique patented expanding internal gage that "tells the whole story" about a precision bore. To a fraction of .0001", it shows actual diameter and reveals irregularities of shape if present. Automatic features assure precision results by untrained users. Widely used by airplane, ordnance, automotive, electrical shops.

Request Bulletin 27

THE COMTOR CO.

62 Rumford Ave., Waltham, Mass.



MEYERS *"Dia-Brasive"*

MULTIPLE DIAMOND POINT DRESSERS

for Efficient, Economical Service

With "Dia-Brasive" Multiple Point Dressers, numerous sharp points are always exposed to the work, or face of wheel. New points can be secured by turning dresser a quarter or half turn. The small diamonds are more reasonable in price, and remain sharp longer, than large stones. We also make a complete line of single point diamond dressing tools. Special dressers built to order.

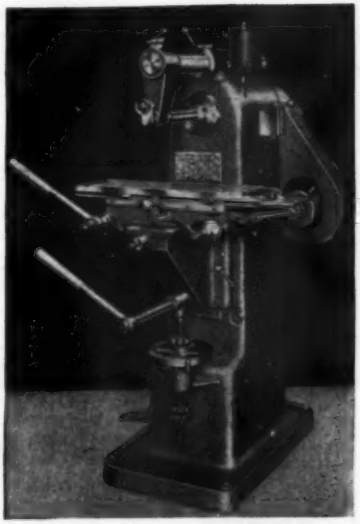
Write for new literature.

W. F. MEYERS CO., INC.

Dept. M, BEDFORD, IND., U.S.A.

No. 3 Small Miller

A new No. 3 high speed small parts Milling Machine with auxiliary power feed is announced by Wigglesworth Machine Tool Co., 191 Bent St., Cambridge, Mass.



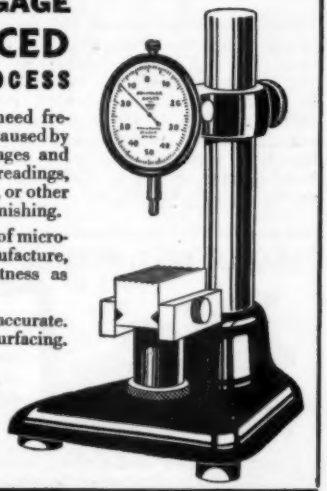
The Timken bearing spindle is supplied with No. 40 standard milling machine taper.

The machine can be supplied with oil pump and tank.

A special single T-slot production table is provided. Table feed may be by hand or power. The power longitudinal feed drive is thru a pair of 45° angle spiral gears in the saddle. This assembly is held in a rocker which throws into and out of mesh with the table rack. The worm has 5 teeth in working contact with the rack at all times.

Feed gear mechanism consists essentially of a set of planetary gears. Drive to table feed is taken from a 3-step cone pulley on rear of spindle to a 3-step pulley on feed shaft. Proper reduction of spindle speeds is obtained

COMPARATOR and SNAP GAGE
ANVILS RESURFACED
by the ACME FLAT LAPPING PROCESS



* Gage blocks and anvils, (serrated or plain), need frequent check-ups to detect the surface deviations caused by local wear. To insure that your comparators, gages and other measuring instruments will give *accurate* readings, send your comparator and snap gage tables, anvils, or other flat contacts of any type or style, to Acme for refinishing.

Because Acme is equipped to measure in terms of microinches, and experienced in extreme precision manufacture, surfaces can be finished to as near absolute flatness as your requirements dictate.

Be sure your measuring instrument anvils are accurate. Send them with any other *flat* parts to Acme for resurfacing.

ACME INDUSTRIAL COMPANY

Makers of Hardened and Ground Precision Parts

210 N. Laflin St. Chicago, Ill.

MONroe 4122

COLMONOY SAVES VITAL METALS

The Pug Knives shown above tell a graphic story of the amazing wear resisting qualities of COLMONOY hard-surfacing alloys and overlay metals.

1. New, 24 lb. pug knife, made of high alloy steel.

2. and 3. Same type, after only 3 months of service. Worn beyond efficient operation, with several pounds of high alloy steel worn away.

4. and 5. Same type. Each blade coated with 1½ lbs. of COLMONOY. In constant use for over a year, and still going strong.

COLMONOY is playing a vital part in the machine tool industry. Use it on parts subject to great wear — lathe centers, dogs, chip breakers, wire straightening shoes, thrust bearings, screw machine fingers and cams, grinder feed fingers, forming and drawing edges, etc.

Write for full information.

WALL-COLMONOY CORP.

BUHL BUILDING, DETROIT, MICH.

BRANCH OFFICES AT NEW YORK CITY, BLASDELL, N.Y., CHICAGO, TULSA, WHITTIER, CALIFORNIA. OTHER BRANCHES IN CANADA.

thru the planetary gears to give correct feeds to table.

Lever feed to table is 10"; crank or power feed to table, 20"; Transverse feed, 5¼"; Vertical motion to knee, 10"; Maximum distance, spindle center to table, 10"; Table working surface, 7x20"; number of feeds, 6; number of speeds, 6 (150 to 800 rpm); motor, 1 hp, 1200 rpm a-c; domestic shipping weight, approximately 1200 lbs; floor space, 42x44"; height, 54".

GRAHAM MULTI-PURPOSE VISE

Saves valuable tool-making hours—gives ready-made jigs & fixtures

Made in several sizes, this parallel and four-square vise serves every ordinary vise purpose on drill press, radial, miller, grinder, planer shaper. In addition—through the use of special jaws and attachments we provide—the vise positions repeat-operation work of endless variety, saving the cost of custom-made jigs and fixtures.

ASK ABOUT OUR KNURL HOLDER FOR LATHE TURRET

Request illustrated price circulars

GRAHAM MFG. CO.

60 BRIDGE ST. EAST GREENWICH, R. I.

Welding Timer Booklet

Sequence and automatic weld timers, which increase weld production and reduce outage time, are described in a new 6-page booklet.

The illustrated booklet gives application information and special design features; also diagrams showing complete sequence of operation in pulsation welding and how the electronic timer and other controls fit into the average resistance welding circuit.

The electronic timer is designed for resistance welders using air or hydraulically operated electrodes, with solenoid operated valves. Timing panels are available as either automatic weld timers or sequence timers.

These timers are adaptable for controlling spot, butt and projection welders. 16 models conforming with NEMA standards are housed in duplicate standard cabinets. 2 tables are given, one for automatic weld timers, and the other for sequence timers. These tables give the NEMA type number, type of welding, operation, timing function, and rating.

A copy of booklet B-3079 may be obtained from Dept. 7 - N - 20, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

Buy War Saving Stamps
— and lick them on the other side

GOOD NEWS!
for DIE MAKERS

Transfer Points Eliminate Guesswork in Die Making

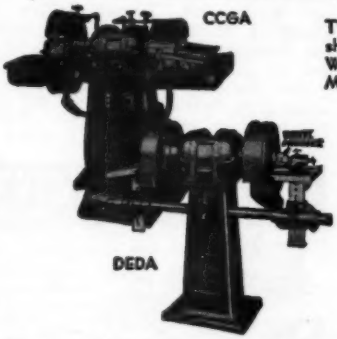
There's no chance for error when you use transfer screws as markers in setting dies. Points are of uniform height above hex base. Six accurately made and hardened screws nest in a special holder with hex wrench tip. Made in ¼" to 1" diameters.

3/16"	$1.50 per set	5/16"	$1.25 per set	7/16"	$1.40 per set
1/4"	1.20 " "	3/8"	1.35 " "	1/2"	1.50 " "

HEIMANN MFG. CO., URBANA, OHIO

SHELL-PRODUCTION

AT THE SPEED OF A BULLET!



TYPE CCGA CARBIDE TOOL GRINDER to sharpen cutting tools for machining operations. Wet or dry grinding. 12 Models . . . Reversible Motors.

TYPE DEDA DISC GRINDER for finishing Shell Base. Example: 37 MM Shell, use 3 HP with 12" discs. 105 MM Shell, use 10 HP with 18" discs, etc. Equipped with lever feed tables.

GRINDERS, Tool Post, Internal, Vertical Spindle, Bench, Pedestal. **BUFFING** and **POLISHING** machines up to 25 HP.

Write for Catalogue showing other production tools.

The STANDARD ELECTRICAL TOOL Co.
CINCINNATI, OHIO
1954 W. Eighth St.

COMET

BORING, FACING and INTERNAL THREADING TOOLS

For holes from ⅛" upward, 15 different sizes

Made of Super-High-Speed Steel Specially Heat Treated

Indispensable for your JIG BORER. The worm-like spiral of the boring heads provides a long, useful cutting surface. Their use insures perfect fitting threads. Correctly designed for precision work.

Write for complete data.

COMET TOOLS, INC.
738 Broadway, New York, N. Y.

Air-O-chek
TRADE MARK
LEAKPROOF
AIR GUNS

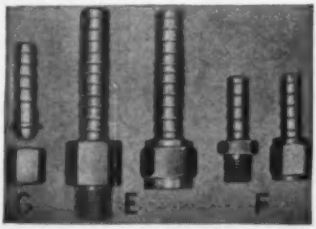
No Packing Gland to LEAK
Streamlined—No External Levers
Only 3 Moving Parts

Repeat Orders by the 1000's from LEADING PLANTS

Only Air-O-Chek Air Guns have the enclosed lever that operates the valve thru a ball and socket joint. All moving parts enclosed within the valve and the hose.

Operators say, "It's easy to use." Production men say, "It keeps working—doesn't leak—saves air." Maintenance men say, "We install 'em and forget 'em."

Made in many types and a full range of sizes. Write for bulletin.



Fittings for Air and Welding Hose. Standard and extra long shanks. Shipped from stock. Catalog on request.

AIR-WAY PUMP & EQUIPMENT CO.
401 S. Jefferson St. • Chicago, Ill.

Morrison Absorbed By Hardinge

Morrison Machine Products Division of Hardinge Brothers, Inc., Elmira, N. Y., has been discontinued. Their products, consisting of Collets, Feed Fingers, Pads, Form Tools and Cut-Off Tools for Automatics, Turret Lathes and Chucking Machines become a part of the Hardinge line and will be sold under the name of Hardinge.

This has been done to eliminate the keeping of double records by the many customers of each division.

LESLIE HAND PUNCH PRESS
MOST CAPACITY
POSITIVE ALIGNMENT

Max. cap. 2⅝ dia. hole thru 10 ga. iron, proper shear on punch, throat depth 6¾. Takes punch presses up to 3⅝x4½ in area. Leaf arm gives perfect alignment without ways or leader pins. Portable.

Ask your dealer, or write for circular

LESLIE WELDING CO.
2947 Carroll Ave. Chicago

the hotel preferred

hotel metropole

a stopping place modern in every detail, yet maintaining a friendly atmosphere and hearty hospitality • preferred by experienced travelers • dining room • garage adjacent • rooms from $1.50 • with bath from $2.50

cincinnati

Acheson Technical Bulletin

Revised technical bulletin (No. 230.8) covering current revised standard dispersions of "dag" colloidal graphite in various carriers has been issued by Acheson Colloids Corp., Port Huron, Mich. Included in the bulletin are major applications for the use of colloidal graphite dispersions, such as "Aquadag," (in water), "Oildag," (in petroleum oil), "Castordag," (in castor oil), "Glydag," (in glycerine), as well as "dag" dispersions in the more volatile liquids such as mineral spirits, the latter being a newly standardized highly flexible graphite concentrate.

The latter dispersion is being used not only for high temperature lubrication but also for impregnating such materials as fabrics, etc., according to the new bulletin.

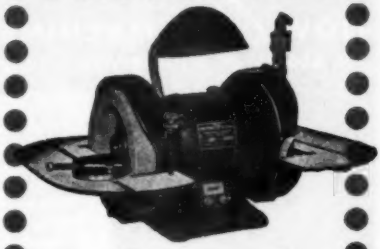
Also covered in the bulletin are "Prodag," a concentrated graphite suspension in water largely used for parting compounds, coarse wire drawing, and for forging lubricants, and the new type 1175 "dag" graphite dispersion in petroleum oil designed for heavy duty forging and extensively used in shell forging work as well as for its electrical properties as a 'static bleeding' additive to other lubricants.

What Scrap Can Do

In a single month, the Westinghouse Electric & Mfg. Co., reclaimed enough aluminum from machine shop scraps to build 10 Army bombers. After pure aluminum and copper are removed from the scrap, the remaining metal is melted into 100-pound ingots. These are tested chemically and sorted into 50 kinds of alloys for re-use in Westinghouse factories.

New Proving Grounds

To make sure Westinghouse circuit breakers will protect electric systems against even the most powerful short circuits, engineers now test these protective devices with 2,000,000 kilowatt electrical punches—equal to the power of 75,000 lightning bolts. This test power is produced by two 500-ton generators in a new high power laboratory at the East Pittsburgh Works.



Prosser

CARBIDE TOOL GRINDER

Quick Deliveries from Stock

Removes metal fast when rough grinding.

Finish grinds smooth, keen cutting edges.

Oversize 7" wheels give greatly increased wheel life.

This grinder will quickly pay for itself by increased tool performance and life between grinds.

Write for details of this and heavy duty Carbide Grinders

THOMAS PROSSER & SON

120 Wall St. New York

NOW One MACHINE
for scores of milling operations
THE ARMOR MILL WITH HYDRAULIC FEED . . .
Unprecedented range and extreme flexibility is achieved in the Armor Universal Turret by the combination of a horizontal spindle and a vertical spindle capable of any angle, mounted on single rigid turret, rotating a full 360°.
NO OTHER MACHINE HAS ALL THESE FEATURES
1. Hydraulic Feed
2. Hand Feed
3. Vertical & Angle Spindle
4. Horizontal Spindle
5. 3 High Spindle Speeds
6. 3 Low Spindle Speeds
7. Revolving Turret
8. 16" Vertical Travel
9. 16" Longitudinal Travel
10. 8½" Cross Travel
Entire tolerances held to less than one thousandth.
ARMOR
UNIVERSAL TURRET MILL
AIRCRAFT MACHINERY CORPORATION
BURBANK • CALIFORNIA

positioned fillet welds in approximately 90 min. Using a 5/16" electrode in one pass, we make the same weld in approximately 30 min. We are saving about one hour per unit or about 45 man-hours per week on this one item."

Black, Sivalls & Bryson, Inc., Oklahoma City:—"The savings for the 5/16" rod over the 5/52" rod on cost of metal deposited is about 50%. Not considering overhead with 100% operative factor these costs vary from 46c per lb for 5/32" rod, 40c per lb for 3/16" rod, 26c per lb for ¼" rod and 22c per lb for 5/16" electrodes."

Welding is faster with larger-size electrodes, because the larger sizes deposit metal faster. The result is not only greatly increased speed of welding for faster production of vital war equipment but the freeing of 25,000 trained welding operators for other or additional essential work. Cost of welding is also materially reduced, it is said.

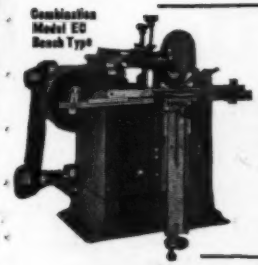
There is said to be a widespread movement in war plants toward the larger electrode sizes. Many concerns have already made the change and countless others are studying their production welding operations to adopt the larger sizes wherever possible.

Faster Welding

Increased speed of welding thru use of larger diameter electrodes, a move advocated by Lincoln Electric Co., to speed war production, is reported by many plants engaged in war work.

That use of larger diameter electrodes greatly increases welding speeds is indicated by typical reports recently received.

St. Paul Structural Steel Co., St. Paul, Minn.:—"Using a 5/32" electrode in 3 passes, we made about 72" of ¼"



SHARPEN YOUR OWN SAWS

SAVE OVER 80% ON SHARPENING HACK, BAND, CIRCULAR SAWS

The WARDWELL SAV-A-SAW automatically sharpens saws with teeth as fine as 32 to the inch at a speed up to 75 per minute. Savings on 2 gross of blades will pay for the machine. Assures keener cutting saws at extremely low cost.

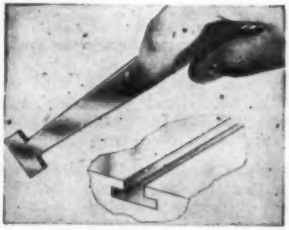
Write for complete information

THE WARDWELL MFG. CO.

3165 FULTON RD. • CLEVELAND, OHIO

Machine Tool Slot Cleaners

Dayton Rogers Mfg. Co., 2835 12th Av. S., Minneapolis, Minn., offers a new, improved handy machine tool



slot cleaner for removing chips and other foreign material from the average planer, milling machine and other machine tool slots. The device has a small and large cleaner on opposite ends that will take care of a large percentage of machine tool table slots.

It is made from .165" thick high quality flat steel and finished to prevent rusting. Approximately 6" long, it has a hole to hang up conveniently. It is available free on receipt of request addressed on a company letterhead

Modern Precision Booklet

Leeds & Northrup Co., 4934 Stenton Av., Philadelphia, Pa., offers a 16 page publication of general interest to engineers, research scientists, executives and users of electrical instruments, control and furnaces.

Called "Modern Precision," it contains news of L & N instruments, controls and heat-treating methods, and of the jobs they are doing in industry, in research laboratories and in teaching and testing. An addition to other L & N literature, it suppliments the regular catalogs, bulletins and circulars which will continue to be issued as before.

Machinists—Tool & Die Makers—Sheet Metal Men—Pattern Makers—Get...

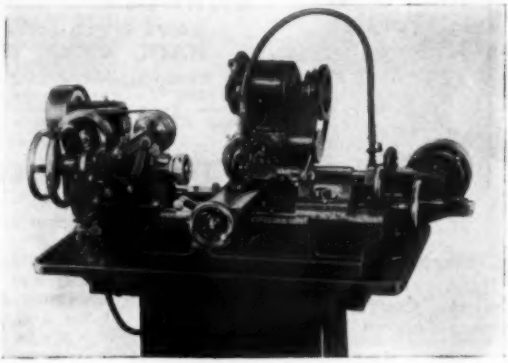
FREE SAMPLE TAMMS BLUE LAYOUT DOPE

Speeds layout time on brass, aluminum, copper, tin, stainless steel. Won't chip, crack, or flake off. Comes in handy 8 oz. bench type brush-in cans. Also pts., qts., gals., drums. *Send for sample now!*

Tamms Silica Co.

228 N. LaSalle St., Chicago, Ill.

Waltham Redesigns Thread Miller



The Waltham Machine Works, Waltham, Massachusetts, have issued a new bulletin describing their Thread Milling Machine.

While they have made Thread Millers for a number of years, they have made several important changes in design. The machine is now completely motorized.

Various attachments increasing the usefulness of the machine are available, such as—Relieving, Internal Threading, Multiple Cutter Threading, etc. The machine can be arranged for cam operation.

The Waltham Thread Miller is especially designed for small work and has become very popular with manufacturers who have relatively small pieces to be accurately threaded.

Swing over carriage is 3"; best adapted for 2" diameter or smaller work; 8¾" length of thread may be cut if work is held on centers; if one end is held in spring chuck, 10"; hole diameter thru spring chuck ⅝"; ¾" diameter hole thru work spindle; maximum distance between centers; cutter dimensions 1-11/16" diameter, .20" thick, 7/16" hole, 3/32" keyway; floor space 48x34"; new weight with standard equipment 850 lbs. Three motors are used, allowing individual speed change and reverse for cutter and work and constant speed for pump. Machines can be arranged with speeds suitable for brass or steel, and by changing ratios for both. Single start and stop station controls all motors.

Standard equipment includes 1 milling cutter; indexing device for cutting multiple threads; 5 pitch lead screw; change gears for cutting broad range of threads from 5 to 40 per inch.

Extra equipment for broadening scope of machine includes: — compensating bar; plain taper attachment; compound taper attachment; translating gears; metric lead screw; relieving; internal threading; multiple cutter threading; cam operation; special tailstock, etc.

Micro Supreme IMPROVED LAY-OUT DYE

for SHARPLY DEFINED SCRIBED LINES

LOW IN PRICE

for TOOL, DIE, PATTERN, OR TEMPLATE LAYOUT ON METAL

One Quart $1.50
One Gallon $4.25 Five Gallons $18.75

MICHIGAN CHROME & CHEMICAL COMPANY
6350 East Jefferson Avenue • • Detroit, Michigan

We're
with you, boys,—
100% !

SPECIAL BOLTS, NUTS and STUDS
DIE SINKING and DROP FORGINGS
SCREW MACHINE PRODUCTS • HEAT TREATING
SPRAYED METAL EQUIPMENT

Estimates gladly submitted. Send samples or blueprints. Catalog on request.

RHODE ISLAND TOOL CO.
148 West River St., Providence, Rhode Island
Serving American Industry Since 1834

RITCO

GES *Electric Hand Shears*

NOW AVAILABLE — FOR NATIONAL DEFENSE

CAPACITY—CUTS 14 GAUGE SHEET STEEL OR 16 GAUGE STAINLESS

This new sheet metal shear was brought out to fill the demand of the sheet metal industry for a very light weight but powerful, fast cutting tool, capable of cutting accurately to the line along straight lines as well as along small curves.

This sturdy shear will give a life time of service. The ball bearing "Grip" type Universal motor ⅛ horse power will operate on either AC or DC and 110 or 220 volts, 25 to 60 cycles. This new model has fuse protection incorporated in switch box. Alloy Steel cutters—will cut at the rate of 6' 6" per minute on 14 gauge sheet steel. *Write for further information.*

James W. George Machinery Company
3146 EAST JEFFERSON AVENUE, DETROIT, MICHIGAN

You'll Agree!

"...THE BEST ALL AROUND OFF-HAND GRINDER OUR TOOL-MAKERS EVER USED"

The Model **H**

- HANDIER GRIP
- MORE POWER
- 50,000 R.P.M.

KIPP *air* **GRINDER**

Madison-Kipp tool-makers originated the first really high speed grinder. They know a great deal about the practical side of grinder design and grinder usage. They think the new Model H is the best all around off-hand tool they have ever tried and we are sure you will agree with them. If you are doing priority work . . .

Order Today $29.75

Please attach preference rating certificate with order.

MADISON-KIPP CORP.
207 WAUBESA STREET
MADISON, WIS., U. S. A.

"Helping Industry Help America"

This handsome new 32 page booklet is filled with helpful hints and vital lubrication data furthering the war effort. Numerous case histories are given. For instance in one large plant working on war materials, production was being seriously retarded because chasers were wearing rapidly on threading operations — required grinding every 50,000 pieces. The problem was studied by a cutting oil engineer . . . a change to the right cutting oil made . . . and the result was an increase to 250,000 pieces per cutter grind—a 40% increase to speed production and victory.

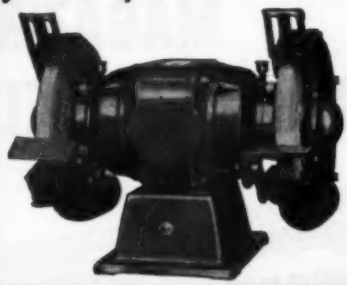
This is only one of the many thousands of cases where the difference between the right and wrong petroleum product meant the difference between average production and production at rated capacity-plus.

The files of Sun Oil Engineers contain hundreds of just such cases—experience records that are invaluable to industrial executives and production men to use in their own plants. In view of the benefit that industry can obtain from such records, regardless of brand name or kind of petroleum product used, the Sun Oil Company has compiled this booklet devoted to case histories giving the operations involved, the problems encountered, how they were overcome and the petroleum products recommended to solve the problems.

The booklet has rightfully been titled "Helping Industry Help America," because from cover to cover it is actual case histories of how engineering service in applying petroleum products in metal working, general lubrication, processing, mining, textile manufacturing and other operations is helping American Industry produce more. In view of present-day industrial requirements this booklet should be recommended reading for every industrial executive, plant production man and shop superintendent. Copies are available upon request from Sun Oil Co., 1608 Walnut St., Philadelphia, Pa.

BALDOR
BALL BEARING **GRINDERS**

STURDY BUILT
for Long, Hard Service



ASK FOR BULLETINS
ON COMPLETE LINE

Above: Baldor Special Carbide Tool Grinder, ½ h.p. ball-bearing motor, 6" Silicon Carbide wheels; **$95.00**
Ask for Bulletin 305.

At left: BALDOR Grinder No. 101; 1½ h.p. ball-bearing motor; 1725 r.p.m., 220 volts, 3-phase; 10" Aloxite wheels; **$90.00**
Ask for Bulletin 307.

BALDOR ELECTRIC COMPANY
4368 Duncan Ave., St. Louis, Mo.

Put more PUNCH in your PRESSES with MASTERDRIVES

On punch presses, MASTERDRIVES have high torque, high slip motors to pick up load without shock. Gear motors reduce output shaft speed, permit using large pulleys. High percentage of belt wrap cuts slippage to minimum. Automatic belt tensioning device permits pre-loading belt. You use your present belting, save expense or delay of grooving pulleys or buying new belts. Belt breakage won't capsize drive. Unique mounting permits roll feeds or die removal from back of press. MASTERDRIVES are *complete drive units.* Motor and mounting are engineered, supplied, and guaranteed as a complete installation. 550 specifications for practically all drive requirements.

We'll send name of NEAREST REPRESENTATIVE and latest literature.

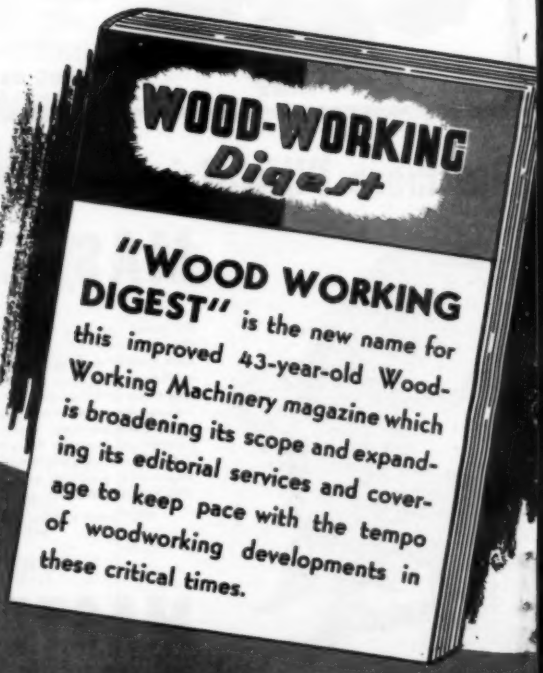
WRITE TODAY.

MASTER ELECTRIC COMPANY
INDUSTRIAL EQUIPMENT DIVISION, DAYTON, OHIO

AN EXPANDING

MAGAZINE FOR AN EXPANDING FIELD

METAL SCARCITY has added impetus to woodworking. In addition, important new developments—startling new methods have enabled wood to supplant metals in many instances. All of this opens almost unlimited possibilities for expansion in the woodworking field. Plywood planes for training and transport—even for combat and bombing—are being seriously considered. And there are countless other important uses for wood—many of them entirely new. *Wood Working Digest* will keep you informed on all the latest developments in this fast-moving field.


WOOD-WORKING
Digest
"WOOD WORKING DIGEST" is the new name for this improved 43-year-old Wood-Working Machinery magazine which is broadening its scope and expanding its editorial services and coverage to keep pace with the tempo of woodworking developments in these critical times.

WOOD WORKING DIGEST — HITCHCOC

Read what one advertiser writes about Wood Working Digest

ANDREW G. CARTER, VICE PRES. & TREAS.

STANLEY W. PORAS, PRESIDENT

THE CARTER PRODUCTS COMPANY, INC.
200 DIVISION AVENUE, N.
GRAND RAPIDS, MICHIGAN

April 16, 1942

Hitchcock Publishing Co.,
508 So. Dearborn
Chicago, Ill.

Attention: Mr. Robert C. Vanlampen.

Gentlemen:

Wish to congratulate you on your change of name to Woodworking Digest, and your new operating program of reaching all of the vital new defense industries. I feel that this program is very timely and will help your advertisers put their product before buyers of equipment in these new defense industries, thus helping your advertisers and those who require new equipment.

We have been advertising with you for some years and have always appreciated very highly the good results obtained.

On the strength of these past results and your new program we are more than doubling our space.

Again congratulating you and thanking you for all past favors.

Yours very truly,

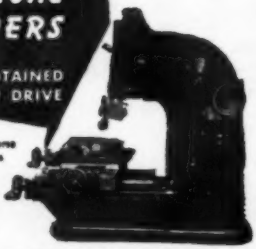
THE CARTER PRODUCTS COMPANY, INC.

A. G. Carter

AGC/k

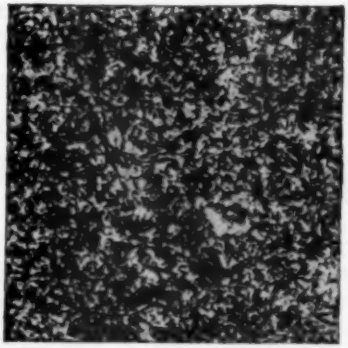
arter Products Co are progressive mfrs. of Band Saws, Wheels d Guide Line Lights for ripping. This firm's products are used odern woodworking plants, navy yards, arsenals, etc.

HBLISHING CO. 508 SOUTH DEARBORN STREET CHICAGO, ILLINOIS

Accurate, High-Speed
MOREY
VERTICAL
SHAPERS
8" STROKE
12" STROKE
SELF-CONTAINED
MOTOR DRIVE
power rapid transverse feeds in all directions
Timken Tapered Roller Bearings for Main Spindle—all others anti-friction.

Built to highest accuracy standards the MOREY VERTICAL SHAPER is simple for tool-room manufacturing. Power feeds and power rapid transverse feeds in all directions are instantly available in all operating positions.
Ask for Circular 726
MOREY MACHINERY CO., INC.
410 Broome Street New York, N. Y.

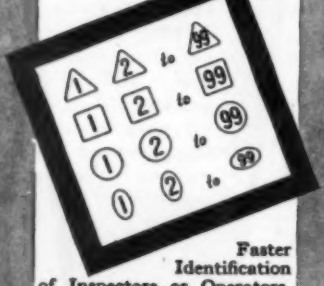
New Jessop HSS

The Jessop Steel Co., 603 Green St., Washington, Pa., announces a new product "TCM High-Speed Steel." Said to fully replace 18-4-1, TCM is a low Tungsten-Molybdenum Steel which cuts as well, or better than 18-4-1.



No change in operating equipment is necessary in using TCM High-Speed Steel because it is heat treated in the same furnaces and the same atmosphere as 18-4-1 High Speed Steel. TCM Steel has a slightly lower hardening temperature. It is lighter in weight than 18-4-1 which means more steel per dollar and more tools per pound of steel.

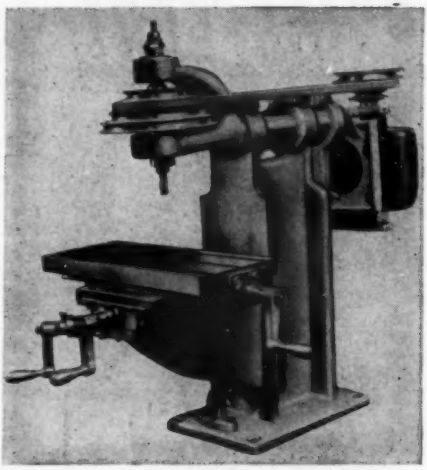
Jessop TCM High-Speed Steel conserves strategic alloys and meets demands for high-speed steels required in our war production effort.

New
INSPECTOR'S STAMPS

Faster Identification of Inspectors or Operators. Different borders may be used for different shifts. Available in 4 sizes. Write for prices today.
NEW METHOD STEEL STAMPS, INC.
DETROIT, U. S. A.

DAVIS
BORING TOOLS

DAVIS BORING TOOL DIVISION
LARKIN PACKER CO., Inc.
ST. LOUIS, U.S.A.

Duro Bench Milling Machine



Said to be equally adaptable to the tool room and high speed production lines, a new precision vertical bench milling machine is announced by the Duro Mfg. Co., 800 E. 61st St., Los Angeles, Cal.

This Duro milling machine incorporates precision taper roller bearings in the spindle, and is guaranteed by the manufacturer to have a run out of but .0003". Convenient, splined disengageable handles operate micrometer adjustments for each direction of the table movement, of which the vertical travel is 7", longitudinal travel 8", and transverse travel 5".

The one piece solid spindle support arm of the Duro Mill is equiped with an adjustable graduated dial and index pin. Adjustments can be made to 60° each side of center. The extra heavy, semi-steel cast frame and spindle arm absorb all excess vibration, permitting accurate operation to one thousandth of an inch, according to the makers.

A unique "floating" motor mount maintains proper tension of the V-belt at all times and permits instant manual change thru the 4 spindle speeds of 450, 850, 1400, and 2100 rpm.

Sturdimatic Issues Catalog

A new four page catalog giving complete information and specifications concerning standard Morse taper live centers has been released by Sturdimatic Tool Co., 5224 Third Ave., Detroit.

With a background of 25 years of experience in tooling for metal working operations, this company also offers a complete engineering service for the designing of special centers whenever required.

Most tool engineers start with the center and work out when programing machine tool operations.

RAPID COMBINATION SAW

Change from full throat to taper in 30 seconds. Patented handle locks blade tight—change in 2 seconds. All-steel construction—crackle grip handle. 6 Types. Write for complete information.

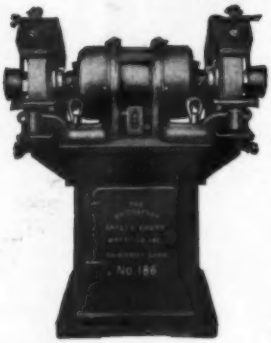
TWO SAWS in ONE

RAPID MANUFACTURING CO.
Box 488, - - Glendale, California

BRIDGEPORT

Motor Driven Floor Grinders

ALTERNATING CURRENT
NOS. 184—186



Hardy, Rugged, throughout, from base to work rest.
Equipped with automatic starter having overload and undervoltage protection. Machine has push button control. Spindles accurately ground, and made of high carbon steel. Large sized ball bearings are mounted in heavy bell type end shields.

Write for folder giving full details.

BRIDGEPORT SAFETY EMERY WHEEL CO. INC.
1304 W. BROAD ST. BRIDGEPORT, CONN.

Three Shop Books

The final 3 in the series of job training units has been issued by American Technical Society, Drexel Av. at 58th St., Chicago. All 7 in the series have been written by the Directors of the Dunwoody Industrial Training Institute in Minneapolis, and all problems have already been tested and proven on the job.

Shaper and Planer job training units contains 115 pages in modern spiral binding and costs $1.25. Its objective is to impart knowledge and develop skills in connection with the operation of shaper and planers in shaping, squaring, surfacing, recessing, internal and external keyseating, dovetailing and T-slotting, taking shear cuts, setting up work of irregular shape, and tool grinding and setting.

Milling Machine job training units is a 110 page book selling at $1.25. This book covers jobs in connection with setting up and operating the various types of milling machines, in selecting and using for different purposes the various milling tools and devices, and in using measuring tools.

Drill Press job training units sells for $1.25 and contains 103 pages. Its aim is to cover jobs concerning setting up and operating sensitive, upright, radial, and multiple spindle drill presses, and drill press operations such as locating, spotting, drilling, reaming, countersinking, counterboring, spot facing, tapping and trepanning, in connection with general machine shop and tool and die jobs.

BURR KEYSEATERS

Mill keyways in the run or on the ends of shafting already erected—save money on alteration, erection, and repair work.

Made in 4 sizes, for hand or motor operation.

Write for Bulletins and prices.

JOHN T. BURR & SON
429 Kent Ave., Brooklyn, N. Y.

Hammond Spray Guard on Carbide Grinders

A new wheel guard on new Models 10 and 14" Carbide Tool Grinders is announced by Hammond Machinery Builders, Inc., 1614 Douglas Av., Kalamazoo, Mich.

The new guards known as "No-Spray — No-Splash and coolant flow control" keep operator and floor dry during wet grinding operation, it is said. The guards are concealed and are close to the wheels—there being no awkward or "in the way" hoods or shields. Thus it is claimed, the maximum amount of light and fullest operating freedom are provided for the operator.

As an integral unit, the hood (which encloses the guards) and the table mechanism, protected from ingress of dust and grit, are mounted on enclosed shaftways and moved in or out from wheel by a convenient crank, providing quick means of adjustment for wheel wear and wheel changes. Hood is easily removed. Water connections inside hood are of flexible hose which permit hood section to be laid on top of machine when changes are made. Wheels are then easily replaced by merely cranking forward the table unit.

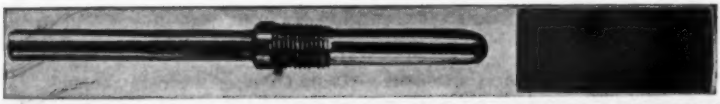
Tables are mechanically controlled by a crank and worm tilting mechanism adjustable to any point between 15° above and 30° below horizontal.

The Model 10 is equipped with 10" diameter Silicon Carbide Wheels, and Model 14 with 14" diameter wheels. Either model is available for wet or dry grinding. Bulletin No. GP-14 gives complete descriptions.

Federal Shell Gage Folder

A 36 page illustrated folder has been isued by Federal Products Corp., 1144 Eddy St., Providence, R. I. describing their very complete line of dial indicator shell inspection gages for cartridge cases, projectiles, primers, fuses, bombs, and small arms ammunition. It is an excellent manual on munitions gaging equipment.

FLEXIBLE ABRASIVE WHEELS



Designed for precision work where flexibility is required, these wheels are useful accessories for sanding and finishing regular and irregular jobs, penetrating into difficult recesses, lapping holes in dies, finishing various shapes of metal, wood, rubber and plastic parts.

Useful for finishing propellers in aircraft construction. Descriptive bulletin and sample wheel will be sent on request. Prompt Deliveries.

FIELD ABRASIVE SPECIALTY MFG. CO.

203 LOWE BLDG., DAYTON, OHIO

THIS JOB

Cemented-Carbide Tipped

Originally, these spray tips for Diesel injectors were formed with steel tools. Because of the constant wear on the tools, considerable difficulty was encountered in holding the form. In addition, it was necessary to polish the parts to secure the proper finish.

Carbide Fabricators have produced the cemented-carbide tipped tools now being used for this job. Tool replacement has been reduced tremendously... production of accurately formed parts has been greatly increased... and the forming operation alone provides the desired finish.

In your manufacturing operations, there undoubtedly are many jobs on which Carbide Fabricators special cemented-carbide tipped tools will produce parts faster and more accurately. Their exceptional economy in use has been proved many times over on high production work. Your inquiries regarding prices and deliveries will receive prompt attention. Blueprints should accompany each inquiry.

CARBIDE FABRICATORS PRODUCE A WIDE VARIETY OF SPECIAL CEMENTED-CARBIDE TIPPED CUTTING TOOLS AND OFFER A COMPLETE LINE OF STANDARD TOOLS.

Carbide Fabricators BERKLEY MICHIGAN

DIVISION OF MORSE TOOL COMPANY · DETROIT

Mechanics Through the Ages

CHINESE BRIGANDS STILL CARRY HIDDEN IN THEIR SLEEVES THE ANCIENT "SPRINGGUN" OF THE ORIENT. THIS GUN IS A BRASS TUBE, FITTED WITH A SPRING, WHICH SHOOTS SHORT DARTS OR ARROWS WHEN A SLIDE ON THE TUBE IS PRESSED.
DURING THE MIDDLE AGES, THE NATIVES OF REMOTE ENGLISH VILLAGES CALLED UPON THE VILLAGE BLACKSMITH TO DOCTOR THEIR AILING CATTLE.

When DR. LIVINGSTON DISCOVERED THE ZAMBESI TRIBES OF DARK AFRICA, HE FOUND THEM MAKING REALLY FINE IRON. INDEED, THEY CONSIDERED ORDINARY ENGLISH IRON "ROTTEN"! THEIR IRON TESTED IN ENGLAND WAS PRONOUNCED SURPRIZINGLY LIKE SWEDISH, HIGHLY CARBONIZED AND HAVING STEEL PROPERTIES WHEN CHILLED.

RUST Spells WASTE!

Ensign 395 METAL PRESERVER

Eliminates RUST HAZARD

Economical, Long-lasting Protection to Interior and Exterior Surfaces, Industrial Structures and Equipment.

Not a PAINT—A PENETRANT

By penetration, 395 inhibits underlying rust, expels air and moisture and seals the surface. Flexibility of 395 permits expansion and contraction with metal—hence no checking, cracking, chipping or peeling.

With 395 on the JOB REPLACEMENTS ARE NILL

Write for folder containing full details

371 Belt Preserver — SINCE 1904 — 384 Rope Preserver

ENSIGN PRODUCTS CO.

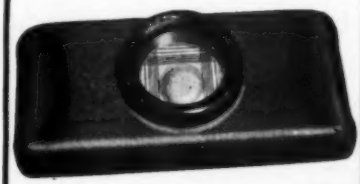
3528 E 76th St Cleveland Ohio

"Lux Goes to War"

The ladies who "Lux" their dainties daily may not find themselves up against priority problems yet because of war industry demands, but at least in one instance, their favorite soap flakes have been drafted for war production.

In broaching a hole in a pressure pump valve part in mass production, difficulty was experienced in obtaining the desired smoothness of finish when the hole, 3/16" in diameter and 2¼" long, was being broached. Numerous cutting fluids were tried with indifferent success until the engineer from the Colonial Broach Co., Detroit, makers of the broach, and the valve manufacturer hit on the idea of experimenting with a solution of ordinary Lux and water. The result was completely satisfactory, and Lux soap solution is now being used in regular production.

FELL PRECISION LEVEL



A precision "all-way" level for use in machine tool building, setting up and maintenance, whether for establishment of level working surfaces or for the accurate checking of straightness where true level itself is not required.

Graduations are in .0005" per foot and form squares about a circular bubble, thus giving coordinate readings and showing the direction and amount of slope, if any. Made in two sizes—5⅛"x12"; 3⅛"x6".

Write TODAY for bulletin giving full details.

Wm. B. FELL COMPANY

700 South St. Rockford, Ill.

Special Box, Convenient to Use

ATLANTIC ★ BAND SAW BLADES

Speed Up Metal Cutting Production

Atlantic Metal Cutting Band Saw Blades have been developed through twenty years of research and specialization.

Send for Free Booklet

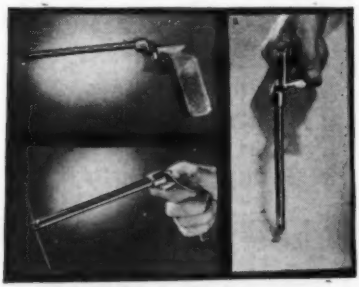
ATLANTIC SAW MFG. CO.

Metal Cutting Band Saws *Exclusively*

153 Brewery St., New Haven, Conn.

Alpert Cutter-Retriever

Compactly designed to cut wire with one-handed (one-fingered trigger operation) and also to retrieve or to hold in a powerful grip, nuts, bolts, washers, cotter pins, etc. extracted from otherwise inaccessible points, the Alpert "Long-Nose Cutter-Retriever" will be distributed nationally by the Pack-Rite Machine Corp., 828 N. Broadway, Milwaukee, Wis.



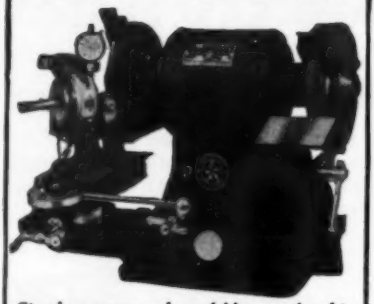
The device resembles a pistol, the cutting edges being located at the end of the long slim barrel. To cut wire, the operator merely places the wire between cutting edges at the "business-end" and snips, bringing down the trigger which actuates a rod operating inside the barrel. The leverage ratio is 15 to 1, hence practically no thumb pressure is required on trigger.

To retrieve a small part which may have dropped into a crank case, the "long-nose" barrel is merely poked into the hard-to-get-at place, trigger brought downward and the hardened steel cutters pick up the missing part.

Non-Magnetic Miniature Bearings

Miniature Precision Bearings, Keene, N. H. has announced 3 new types of non magnetic radial and pivot bearings. They are applicable where magnetic bearings would introduce instrument variations, to avoid electrical conductivity, and to resist salt spray vapor or other mild corrosives.

Precision Drill Grinder



Simple to operate—dependable—speedy—this Precision Grinder will enable you to produce perfect points on standard twist drills in sizes from No. 41 (.096) to 5/8" (.625).

Send today for more details.

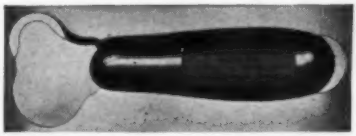
Star Machine & Engineering Corp.

Division Star Electric Motor Co.

Bloomfield, - - - New Jersey

Dzus Fastener Driver

A single driver so designed that it will operate 3 sizes of Dzus Fasteners is announced by Products Engineering Co., 700 E. Florence Av., Los Angeles, Cal.



Being adaptable to large, medium and small Dzus Fasteners thru a novel arrangement of varying body thicknesses, this provides a multi-utility tool that replaces 3 special drivers.

Body of the tool is of cadimum plated heat treated chrome-moly steel and handle is of specially constructed non-breakable—shock-resisting plastic.

EKLIND UNIVERSAL MILLING HEAD

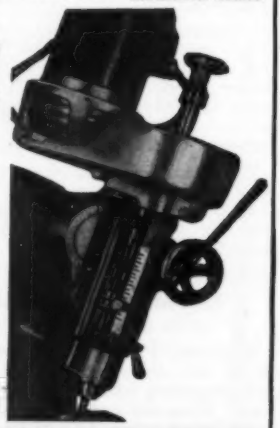
CAN BE ADAPTED TO ANY MACHINE

MILLS DRILLS BORES

at any angle

Speeds from 250-4000

Write for Circular



UNIVERSAL HIGH SPEED TOOL CO.

551 W. Washington Blvd. Chicago, Ill.

600 ROOMS with BATH and RADIO

FROM $3.00

- Ideal Location
- Unlimited Parking
- Radio in Every Room
- Refurnished & Redecorated

HOTEL PHILADELPHIAN

DANIEL CRAWFORD JR. Manager

Broad & Spring Garden Streets • Philadelphia

The Coolant Pump For Every Job—

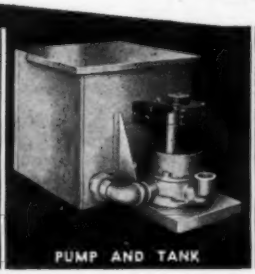
BRADY-PENROD MODEL 600

Durable! This pump stands up under hard use. Hydraulic efficiency as high as 70%. Quickly installed by any shop man at little cost and easily moved from one job to another. Controlled flow—60 g.p.h. with ¾" tubing to 1200 g.p.h. with 1" pipe. ⅓ H.P. NEMA motor meets any demand with negligible current cost. **Tank With Built-in Baffle.** 12" x 12" heavy galvanized sheet iron with baffle separator to collect heavy chips. Painted machinery gray outside. Removable lid for cleaning without disconnecting return piping.

Write or wire today to:

BRADY-PENROD, INC., Muncie, Indiana, U.S.A.

ON A DRILL PRESS

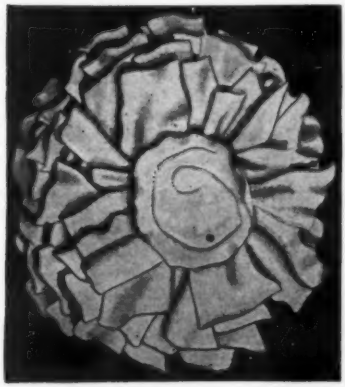


PUMP AND TANK

ON A LATHE

New Sponge Made of Chamois

With an eye to threatened war-time sponge shortages, Tamms Silica Co., 228 N. LaSalle St., Chicago, Ill., announces a new type "sponge." It is made of small pieces of No. 1 quality chamois sewed into a cluster in such a way that it holds plenty of water, without dripping. Known as "Topsy" Chami-Sponge, it can be used wet as a sponge, then wrung dry and used as a chamois. Tamms also announces the design of a Mesh Wool Sponge, made from sections of select natural wool sponges securely enclosed in a soft absorbent net. Both products are made in two sizes for professional and general use.



New Safety Folder

The 4 page pamphlet "Safety is Simply a Matter of Horse Sense" was prepared by A. Schrader's Son, 470 Vanderbilt Av., Brooklyn, N. Y., for Industrial Engineers interested in production as well as safety. It gives valuable information on equipment which will reduce accidents thru the intelligent use of compressed air. The Safety Installations described are not only easy to install and operate, but the most interesting point is that they increase production, it is claimed.

Motorizing Older Cleveland's

It will be good news to owners of older belt-driven Cleveland Automatics that Drive-All Mfg. Co., 3402 Conner Ave., Detroit, has perfected an individual motorizing installation calling for but one electric motor to drive all the units on the machine, instead of the 2 or 3 formerly needed. The gear box and motor are attached to the machine, using standard brackets and this same supporting standard mounts the jackshafts that drives both pump and feed. A 1½" square bar running full length of the machine provides a backbone for the installation, and a base on which to mount the various brackets. Since this square bar is used in connection with all Drive-All installations, brackets taken from stock can be used, and therefore prompt delivery is available.

Motor-driving Cleveland Automatics is said to furnish a more positive transfer of power to spindle, allows for speed changes to compensate for differences in diameters and materials and converts machine into a self-contained production unit.

M-B SUPER-SPEED Pneumatic GRINDER

Model SS-SR

Write for Details of FREE TRIAL OFFER

A 100,000 R. P. M. Unit

The only hand grinder with spindle speed of 100,000 R. P. M. on 100 pounds air pressure. It has revolutionized hand grinder performance. Can be directed in any working position; operates with extreme ease. Steel construction throughout. Formed to fit the hand.

Also other models and Air Line Filters and Automatic line lubricators.

M-B PRODUCTS

EXPORT OFFICE 44 WHITEHALL ST New York, N.Y., U.S.A.

1100 E. LARNED ST. DETROIT, MICH.

Allen Punch Press

A power bench type punch press is made by Alva F. Allen, Clinton, Mo. Its height is 17½" and base size is 8½" square. Distance from ram to bed when up is 4⅛". Speed is 200-300 rpm, and ¼-½ hp motor is required .

Among its uses are light blanking, drawing, forming, riveting, etc. Use of a small press such as this often times can release larger presses for other work.

According to the maker, ram travels in accurately machined guides with long bearing face, with ample provision for lubrication. Two hardened tool steel striking pins make for quick acting of clutch. Pull-out lever has hardened contact edge and wear is reduced to a minimum.

THE WONDER CUTTER

Cuts wire or rod up to ⅝ inch round (⅜ inch square) and band iron up to ⅛ by 2 inches. Adjustable stop for repeated cuts to same length. Hardened cutters last indefinitely.

Powerful leverage makes all cuts easy. Small size permits placing wherever convenient.

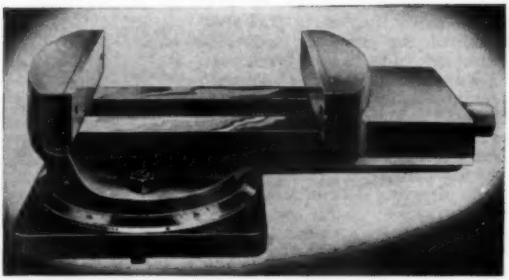
Small in size but a giant for work. The lowest priced rod and band cutter on the market. Every shop needs one. Hundreds in use.

You can get one for free trial in your own shop.

Write today for further details and price!

THE FEDERAL FOUNDRY SUPPLY CO.
4602 EAST 71st STREET, CLEVELAND, OHIO

Ross Offers "Victory" Vise



A new heavy duty precision vise has been introduced by David J. Ross Company, 102 Ross Park, Benton Harbor, Mich. The designer is Edward Rousselle, Chief Engineer, who states that while the "Victory" Vise is fundamentally standard in general design, it incorporates special features which should prove interesting to firms engaged in war work, where accuracy and speed are of equal importance.

Some of the interesting features claimed for this new product are:—extra clearance provided for full freedom when swiveling over base clamps; oversize bearing area on ways and sliding jaw, for increased strength and accuracy; complete graduations around entire dial for easy reading and quick set-up; novel clean out hole below stationary jaw for quick removal of chips and waste from around screw (this solves a common disagreeable cleanup problem); hardened and ground tool steel jaw plates which will open to full 13" capacity. This extra capacity may be found especially desirable in special holding problems created by war time products. They are made in 3 sizes; 7", 10" and 13" jaw capacity.

Taking Pictures in Dark

Photographs can now be safely made by Army, Navy and newspaper photographers during blackouts. Two new photoflash lamps, announced by the Westinghouse Lamp Division, produce invisible infrared light which makes it possible to take pictures on infrared film in the dark. The lamps (numbered 5-R and 22-R) are made with special glass which will not pass the visible light produced by the flash, but will pass the picture-making invisible infrared.

Buy a share in America with United States War Savings Bonds and Stamps

CLOSED OPEN

TRADE AUTOM MARK

Plain Type Offset Type

CONTINUOUS HINGES

All hinges shown can be furnished with special holes, cutouts and bends to blue-print in metals to suit the job.

THREE-FOURTHS OFFSET.

AUTO MOULDING & MFG. CO.

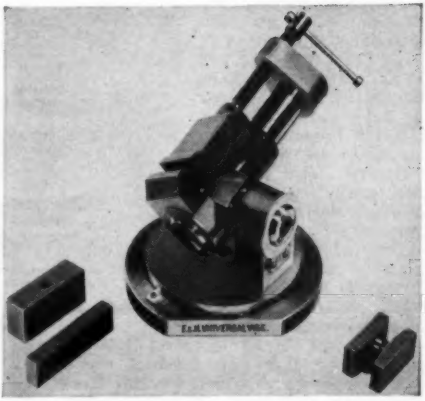
2326 S. CANAL ST

CHICAGO

SPECIFICATIONS:
Open Width 1/8" to 6"
Gage Material .040 to .125
Pin Diameter .101 to 3/8
Lengths to 120"

SEMI-OFFSET

F & H Universal Vise



An "angle machining package," designed for material reduction of set up time in the production of compound angles, is announced by the F & H Mfg. Co., 6024 Ellery St., Detroit. The package consists of 3 parts—the F & H Universal Vise, with improved locking control, a grinding wheel angle dressing attachment, and a unique swivel clamp for holding odd shaped work pieces. The latter, called "Equi-hold," consists of 2 friction plates joined by ball and socket. It fits between work piece and one jaw of the vise, being fastened to the latter, adapting itself to angle of the piece.

The Vise is of all steel construction, precision built, with hardened and ground steel jaws. Precision in producing any angle, vertical, horizontal, or transverse, is said to be facilitated by the vernier dials. The vise is compact, being only 4¾" high, yet the jaws open to the standard width of 2¼". Weight is 14 lbs.

The third item in package is a grinding wheel dressing attachment which fits into the Universal Vise, eliminating need of a separate angle wheel dresser. Pressing tool is rigidly held at the correct "drag" angle for best dressing results.

Instrument Cleaning

Small parts may be cleaned either by hand as they have been for years, or by a new mechanical process. There is something to be said for both procedures, but is interesting to note how those who have seen it work, are switching to machine cleaning.

At no time in the history of our country has the need for speed been greater, especially in the aviation field. With plants working on 24 hour, 7 day a week schedules, manual cleaning leaves much to be desired.

To help speed production, industrial cleaning machines have been developed. While most instruments still have to be disassembled, time is saved in the actual cleaning, it is claimed. More than one instrument can be cleaned and dried at the same time, more effectively, faster than by hand and without accidents. In addition, sections of instruments can be cleaned without disassembly.

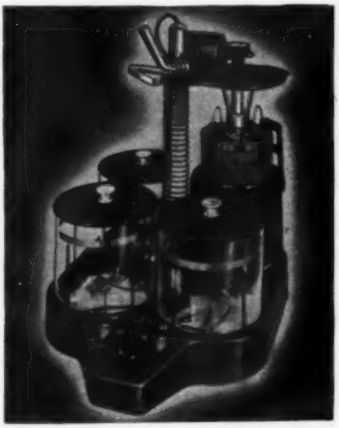
Operating the machine is said to be so simple that an apprentice can handle the running of the equipment, thus releasing experts for phases of work that require greater skill and experience.

First, the elements to be cleaned are placed in the monel metal work basket. This unit is hooked to the motor shaft, completely immersed and rotated in the first jar containing a cleaning solution. This cleaner removes grease, grime, and discoloration without causing rust, corrosion or removal of metal. A rheostat regulates the motor speed controlling the basket. Lid above the basket shaft becomes cover for the jar and prevents spilling of solution when basket is in motion.

Baffles within the jar, together with the unique design of the basket cover, assure thoro agitation of solution for proper cleaning of every part of the instrument. After running in the cleaning solution the motor is cut. Bas-

ket is then raised up in the jar above the liquid level and again rotated to throw off excess solution. Jars are of sufficient height to receive the fluid thus thrown off.

These operations are then repeated in the second and third jars which con-



tain rinsing solutions prepared to work with the cleaning solution.

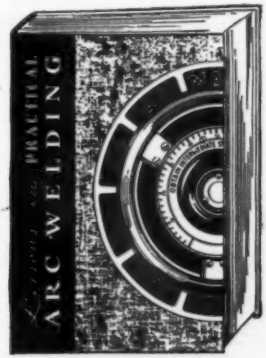
Motor carrier is then revolved to the fourth position which places work basket over drying chamber. Two or three minutes are required for each phase of the cleaning cycle.

Many additional applications of this equipment are discovered daily. Ball bearing manufacturers use them to degrease races. Fire alarm mechanisms, parking meters, clocks and machined small precision parts covered with cutting oils or lapping compounds are cleansed, rinsed and dried thoroly.

The equipment is compact and occupies an area 17¼ x 16½ x 23" high over all. It is easily portable when not clamped to a work bench and may be shifted from department to department as needed. Such a machine is made by L & R Mfg. Co., 54 Clinton St., Newark, N. J.

Lessons in Arc Welding

A new manual of 190 Pages—1942 Copyright—Published by Hobart Welding School — contains the complete series of 41 arc welding lessons — the same basic course as used in the school. For a limited time this new 75c book will be mailed postpaid for 25c in stamps. It covers Preliminary Instructions; Starting and Manipulating the Arc; Welding Common Joints; Welding Light Gauge Sheets; Welding in Flat-



Horizontal-Vertical and Overhead Position; Special Practice & Tests; Ready Reference Index etc. A book written in "easy to understand" words, giving all the fundamentals of Arc Welding, with descriptive pictures, charts and diagrams. Address The Hobart Trade School, Troy, Ohio.

"Lick 'em over here, so the boys can keep on licking 'em over there"

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& BONDS

Sine Bars for Bevel Gear Gauging

A new method of reducing the gauging of bevel gears to its simplest form, and Sine Bar gauges with which to perform this gauging are being offered.

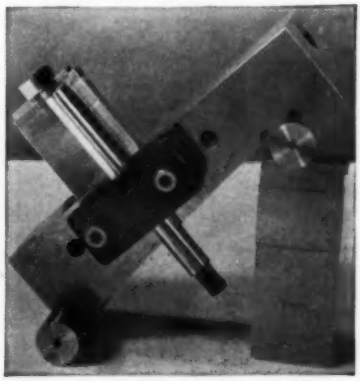
Heretofore, the makers point out, the method of setting up to manufacture and the method of checking precise bevel gears, or blanks for precise bevel gears, have required complicated measuring methods involving difficult computations and manipulations. Even

then, recourse to trial and error often was necessary.

From the illustrations it will be noted that the gauges are provided with an aligning seat which will receive alternatively and will align, either a special apex-defining setting-up bar, or a mandrel on which the gear blank to be measured may be mounted.

The set-up bar is used in conjunction with gauge blocks to define a plane passing thru the apex of the gear cone of the bevel gear as related to the thrust face of the gear hub.

The set up can be made from dimensions usually given on drawings for bevel gears and a direct reading with a dial indicator can be taken to obtain precision gauging. As no involved calculations are to be considered, this gauging may be performed by anyone having knowledge of blueprint reading and ordinary gauging practice.



The gauging functions which may be performed with these tools on one set up are:

1. Check dimensional accuracy of addendum cone (gear face) as related to thrust face of hub.
2. Check accuracy of cone angle.
3. Check run-out of gear face.

These tools are being offered in 2 models, one for use on a conventional surface plate and the other being a self-contained unit with its own base, set-up anvil, gauge rod holders, etc.

The tools are being manufactured by the Herkimer Tool & Model Works, Herkimer, N. Y.

Cartridge Case Die Manual

A 12-page manual (Bulletin D-113) covering standardized dies for small arms ammunition has just been released by Carboloy Co., Inc., Detroit. In addition to giving specifications of all standard Carboloy die sizes for .30 and .50 armor piercing jackets, tracer and ball jackets, cartridge cases, etc., the manual also has an operator training section on finishing and servicing of carbide dies. Details on equipment required, etc. are also included.

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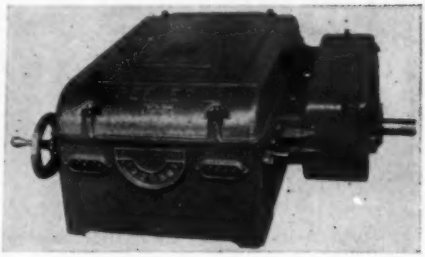
Reeves Transmission with Chain Drive Reducer

Reeves Pulley Co., Columbus, Ind., now offers a special design of compact Variable Speed Transmission, enclosed design, equipped with built-in chain reducer, and with the output shaft in exact alignment with the input shaft.



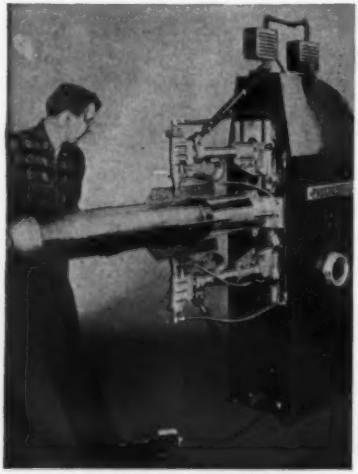
Output speeds may be either increased or decreased as compared to the variable speed shaft of the transmission, and, of course, are infinitely variable, within predetermined limits, by turning the speed control handwheel.

The chain drive operates in a bath of oil.

The unit illustrated was designed for vertical operation with oil drain and filler located accordingly.

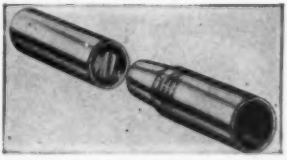
"Stitching" Fins to Flares

Housings for the army's giant parachute flares now have their fins "stitched" on by rows of spot welds, as shown. The machine consists of a Standard Progressive pedestal welder equipped with 2 guns, an upper and a lower, instead of the usual single gun. The center electrode is fixed and serves as a mandrel for guiding the housing. The locating fixture for keeping the fins correctly aligned was removed, to show the guns, etc. The operator merely pushes the housing along, between welds, the machine automatically repeating the welding operation as long as the foot switch is depressed. Both guns weld simultaneously, only one timer therefore being required.



Welding Cable Connectors

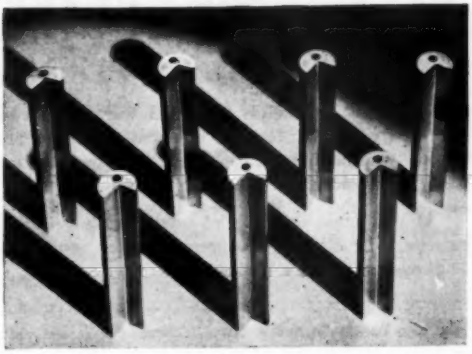
Chicago Tool & Engineering Co., 8383 South Chicago Av., Chicago announces its new Rapid Cable and Terminal Connectors, which provide rapid connection and disconnection, as well as positive locking to prevent parting of connections, it is claimed.



There are no exposed parts, and it is weatherproof. Possibility of shorting, fire hazards and damage to work and equipment is claimed to be eliminated. In addition, due to the combination of screw and tapered sleeve construction, the highest possible conductivity is claimed.

Circular 423 is available giving further details.

Carbide Gun Tools



With completion of experimental production runs, said to result in an increase of 1/3 to ½ in output of drilled gun barrels per man-hour and machine-hour, Carboloy tipped rifle drills for 30 and 50 caliber and 20 mm gun barrels have been placed in production. During the experimental production runs, carried on since last April, several thousand gun barrels were drilled.

The new gun drills are to be furnished with tip brazed to short steel shank which in turn is attached by the users to their regular gun drill tubes. Cutting edges are not finish ground, since experience has shown that optimum angles, etc., will vary among different plants depending on particular machining conditions, materials to be cut, etc. Final cutting edges are therefore ground by the individual user.

The grade of Carboloy selected for the new gun drills is designed to give a free cutting action. It is asserted that the result is a finish which is definitely smoother than that obtained with conventional gun-drills, while at the same time the holes are also straighter.

The explanation is that there is less tendency for the tipped drills to "squeeze tight" in the barrels. While there is said to be less tendency for these drills to seize or "fuse" in gun barrels than is the case with steel drills, this development also insures minimum wear on the OD of the drill tip.

Morton Bench Drill Press

A heavy duty bench type drill press is being made by Morton Aircraft Corp., 3225 Harney St., Omaha, Neb. Height is 35", table travel 10" and spindle travel 4¾". Table surface is 10x12". Standard speeds are 470, 780, 1300, and 1950 rpm. Included as standard equipment are head, belt guard, and automatic belt tightener.

Among its special features claimed by the maker include:—easily adjusted head and table, spindle return spring housing, well guarded spindle that does not project thru pulley, and is easily changed.

The Morton Corp. are also makers of a ratchet tool holder designed for

used on engine lathe, screw machines, or other allied machines, as well as a 38 lb vise with an 8" jaw opening available in smooth or slotted type jaw inserts.

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Gear hobbers, G & E., S.&S., Barber-Colman, No. 2.
Gear shaper, Fellows No. 6.
Grinder, Churchill-Morgan internal.
Grinders, No. 55, 60, Heald internal.
Grinder, Norton, 50x28' roll, m d.
Grinder, P. & W. 12" vertical, 14" b. b.
Grinder, P.&W. 14", b.b.
Grinder, Landis, m.d. 16x52".
Grinder, Cinc. crank shaft 10x60", with raising blocks to 28".
Grinder, Hydroil No. 53 int.
Grinder, B.&S. planer type surface.
Grinder, Norton 16"x50.
Grinders, Modern, m. d., 12x24", 12x42".
Grinder, Landis 20x72" plain cyl.
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Index filing machines, Oliver.
Keyseaters, Baker No. 0, 2.
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Lathe, 24x10' Reed-Prentice, grd. head, m.d.
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Lathe, McCabe 26-48"x14'.
Lathe, 54"x30' New Haven.
Millers, Becker No. 2, 2A vert.
Miller, B.&S. No. 13B.
Miller, Becker No. 6 vert.
Pipe machines, Oster, Williams, 2", 4", 6", 8", m.d.
Planers, 24x24"x6' Whitcomb, 2 head.
Planer, 24"x24"x6' Cincinnati, 1 head.
Planer, 32x30"x6' Whitcomb, 2 head.
Planer, 32x32"x10' Pond, 1 head.
Presses, power, all sizes and types.
Profiler, P.&W., 2 spindle.
Punch, Pels 6' throat, 1⅛"thru 1".
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Radial drill, 5' Western, oil groove base, m.d.
Radial drills, 3' American, Mueller.
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200 spindles of single and mult. spindle drill presses.

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438 Oliver Bldg. Pittsburgh, Pa.

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Gear planer, 36" Gleason, b.d.
Gear planer, 54" Gleason, m.d.
Grinder, univ. No. 5 B&S, 20x72", b.d.
Grinder, Yankee drill, cap. up to 2½".
Lathe, 27"x11' LeBlond, grd. hd. q. c. g., d.b.g., m. d.
Lathe, 20"x12' Reed-Pren., grd. hd., q.c.g., m.d.
Lathe, 10"x45" Seneca Falls, b. d.
Press, hyd. 1000 ton wood platen, 42"x9'.
Presses, o. b. i. No. 3 Toledo and No. 18 Bliss.
Punch, E F Cleveland, 60" th. 1½"—1" arch jaw.
Punch, multiple, style "E" L&A 1½" th. cap. 340 tons.
Punch, No. 2 Hilles & Jones, horiz., b.d.
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Miller, No. 6 Becker vertical, cone.
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Lathe, Fitchburg 34"x60" low swing, geared head.
Lathe, 20" x10' Whitcomb-B., gd. hd., m. d., complete.
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Bolt cutter, staybolt 1¼" Acme, leadscrew, m.d.
Bolt cutters, Acme sgl. & dbl. head, 1⅛"—2½".
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Lathe, 24"x12' Reed, s. b. g., p. c. g., b. d.
Lathe, wheel 78" Bement-Miles, m. d.
Lathe, gun boring, 2 bar, cap. hole 12"x40', m. d.
Miller, vert. No. 2 Becker, tbl. 20"x52", m. d.
Miller, plain, No. 2 Pratt & Whitney m. d.
Miller, plain No. 1½ Kent-Owens, tbl. 24"x7½", m. d.
Paper cutter, 23" Chandler & Price, blade 27".
Paper cutter, 44" Brown & Carver semi-auto., m. d.
Pickling machine, Mesta, 8-12' arms.
Pipe machine, 10" Landis, m. d.
Pipe machines, 3"—4"—12" & 18" Weiland, b. d.
Pipe machine, No. 88 Jarecki, 24"-8", m. d.
Press, double acting, No. 1 Bliss, roller feed,
Press, end wheel Stiles-Parker, stroke 1½".
Press, end wheel No. 3 Bliss, roll feed, m. d.
Press, 250 ton Baldwin-Southwark 4-post.
Press, foot, No. 2 Swaine, bed opening 6"x7½".
Press, forging, 1500 ton Farrell-Birmingham, m.d.
Press, hydr. 200 ton Watson-Stillman upr., stroke 26"
Press, hydr. Woods 1000 ton, platen 42"x9'
Press, horning No. 21 Michigan, stroke 14".
Press, o. b. l. No. 63-C Bliss, stroke 5".
Press, o.b.i. No. 3 Toledo, stroke 1½".
Press, o.b.i. No. 3 Bliss, stroke 2".
Press, perforating, No. 51 V&O, str. ¾", dbl. crk.
Press, straight side No. 89 Bliss, stroke 5".
Press, straight side No. 59 Toledo, stroke 8".
Press, straightening, 20 ton Manley, lever action.
Press, straightening, Hunt hydraulic, 50 tons.
Press, hydraulic shell bending, No. 4, 12-cyl.
Pump, centrifugal Worth. CL-C, 6" suction, 5" dis.
Pump, Worthington 9"x2"x12", 22 gpm. 3000 lb. steam.
Pump, centrifugal Gould 2 H. P., m. d.
Punch & shear, dbl. end Ryerson, ¾" thrt. 54".
Punch & shear, dbl. end No. 1½ L & A, 1⅛"—1", m. d.
Punch, horizontal No. 2 H & J, 1"—1", throat 144".
Punch, multiple W & W cap. 175 ton, m. d.
Punch, mult. 10" L & A, cap. 340 tons pressure.
Punch, lever, No. 56 Niagara, ½"—1", throat 36".
Punch & shear, No. 3 L & A, rap. act. ⅝"-⅝".
Punch & shear, "C" Cleveland, 1"—1", throat 24".
Punch & shear, No. 3 H & J, 1½"—1", throat, 48".
Punch & shear, No. 14 W & W, 1½", 1" throat 16".
Punch & shear, "EF" Cleveland, 1"—1", throat 15".
Punch & shear, "EF" Cleveland, 1½"—1" throat 60".
Punch & shear, Cleveland "G", 2" thru 1", m. d.
Punch, 3-A Royersford, 10" throat, 1"-1", m.d.
Punch, No. 6 L&A, 1¼" thrt. ⅝"-1".
Riveter, 70 ton Hanna, 24" reach.
Riveter, Hanna Pinch Bug, 10" reach.
Saw, cold No. 14 Higley, cap. 7" round.
Saw, cold & rot. planer, No. 216 New., 20" saw, m.d.
Saw, cold, Espen Lucas, blade 22", cap. 6" rd.
Saw, No. 1 Hunter high speed, m. d.
Shaper, draw-cut 48" Morton, m.d.
Shaper, 22" Smith & Mills, m. d.
Shear, allig. Pittsburgh, cap. 2"-2½", m. d.
Shear, allig. No. 7 United, 6" square, m. d.
Shear, alligator No. 4 D&K all steel, cap. 5", b.d.
Shear, alligator, cap. 1½", blade 10".
Shear, Bevel, No. 2 Ryerson, m. d.
Shear, rotary Newbold, cap. ¾", throat. 50", m. d.
Shear, slitting Columbus 10"x3/16".
Shear, sq., 36"x1" United, b.d.
Shear, 40"x¼" American, throat 6", m. d.
Shear, 48"x¼" American, throat 6", m. d.
Shears, squaring, 54"x3/16" United, throat 5", m. d.
Shear, squaring, 10'x14 ga. Ohl, b. d.
Slotter, port. 60" Norton, m. d.
Slotter, 5" Betts, m.d.
Slotter, 15" Dill, m.d.
Upsetter, 4" Ajax, steel bed, m.d.
Upsetter, 6" Ajax, steel bed, m.d.
Vertical attachments, Nos. 1, 3, 4 and 5 millers.
Welders, 150 amps. and 200 amps., portable.
Welder, 200 amp. Lincoln, 4-cyl. gas engine.
Wire straightener, ¼" Schuster, 4' cut-off, b.d.

The Elyria Belting & Machinery Co.

Elyria - - - - - - Ohio

Boring mill, 42" Niles, 2 swivel hds., rapid traverse.
Forging machine, 2½" Ajax.
Milling machine, 9x36 Newton.
Nut tappers, bent tap, ¾" National.
Radial drills, 5' Fosdick & Holliday; 3' Dreses; 30" g.

C. R. Daniels

1514 W. Capitol Drive, Milwaukee, Wis.

Arbor press, No. 5 Greenerd, 12 ton, rebuilt.
Drill press, No. 2 Baush 22 spindle, 16"x30" head.
Keyseater, No. 2 Mitts & Merrill, complete.
Sawing and filing machine, Theil precision.
Turret lathe, 14" Wood, tilted, 1½" bar cap.

USED AND REBUILT MACHINERY

FOR SALE BY

D. E. Dony Machinery Co.

47 Laurelton Rd., - Rochester, N. Y.

Buffers, 2 hp., d.c.
Lathe, 52"x8' New Haven.
Shaving machine, Pratt & Whitney.
Tablet machine, No. 4½ Colton, m.d.

Wm. C. Johnson & Sons Machinery Co.

1211 Hadley St. St. Louis, Mo.

BENDING ROLLS

1 set of pyramid rolls, 6' for ⅜" plate.
1 set of rolls 8' for ½" plate.
2 sets of rolls 10' for ½" plate.

Alex Zeeve & Company

2269 Woolworth Bldg., New York, N. Y.

Bars, portable boring, 8"x18' and 8"x12' Underwood.
Bolt threaders, 2" Acme "Class A", 12" National.
Drill, radial, 3' Mueller, gear box, s.p d., box table.
Gear cutter, spur, No. 2A Newark, s.p.d., cap. 24"x3"
Grinder, cyl., 12"x96" Landis plain.
Hammer, forging, No. 5-N Nazel, pneumatic.
Hammers, pr., 500 (2) & 400 lb. Beaudry "Champion".
Hammer, steam, 250 lb. Niles-Bement-Pond, agle. fr.
Ironworkers, comb., size cpd Schatz cast-steel, shears 3"-12" beams & channels, 6"x6"x⅞" angles, 1½" plts, punches 1-9/16" thru 1½", with coping att., weight about 72,000 lbs.; Size 91-16 Smith armor-plate, with notcher, a.c., m.d.
Keyseaters, No. 2 Mitts-Merrill, No. 3, & 1, Baker.
Lathes, engine—28"x20' Rahn-Mayer-Carpenter semi-q.c.; 28"x16' Walcott, q.c.g., taper.; 24"x16' Whitcomb-Blaisdell, q.c.g., tr, 16"x8' Brad., gh., qcg. m.d.
Miller, No. 6 Whitney, hand, a c., m.d.
Planer, crank, 28"x24"x24" stroke Cincinnati, 1 rail head, belt drive.
Punch & shears, dbl. end, style "W" Cleveland, cap. 2½" thru 1½", with self-cont. jib crane.
No. 3A Royersford, cap. 1" thru ¾", shears 8" x ⅝" flats or 1¼" rounds, a.c., m.d.
Roll, angle-bending, 3"x3"x⅜" cap. Bertsch, m.d.
Rolls, plate-bending, 12'x⅜" cap. Hilles & Jones No. 4, drop-end hsg., bal. bar, geared d.c., m.d.; 8'x⅜" Wickes drop-end hsg., bal. bar, power elev. geared a.c., m.d.
Saw, metal cut, band, Avey "Milband", cap. 6½"x6½", a.c., m.d.
Shapers, 24" Steptoe h.d., b g., cone.
Shears, throatless, ¾"x3", & 10 ga. Marshallt., a c., m.d.
Shears, misc., 8'x⅛" Lennox rotary splitting, a.c., m.d. 60" Yoder rotary, 14 gauge capacity.
Tapper, No. 8 Gaterman pneu. oscillating, ½"x⅜" cap.

ALSO MANY OTHER TOOLS.

Standard Machinery Co.,

347 Indiana Ave. Grand Rapids, Mich.

Drill, 40" New Haven No. 8, sliding head.
Drill, 2 spindle G with tap.
Grinder, cylinder, Heald No. 65.
Hammers, rivet, Grant No. 2 and No. 3.
Keyseater, No. 0 Mitts & Merrill.
Lag screw pointer, Pawtucket.
Lathes, mfg., 12" x6' Pratt & Whitney, (2).
Planer, 30x30x8, Whitcomb.
Roll former, Kane & Roach, 2 sets spindles.
Tapper, Anderson No. 40 Dial Feed Auto.
Welder, Expert Portable spot, 50 KVA.

FOR SALE BY

B. D. Brooks Co., Inc.

361 Atlantic Ave. Boston, Mass.

Sheet metal working machinery, hand and power.
All types of new and reconditioned equipment.
Apron brakes, press brakes, shears, folders.
Bending rolls, corrugating rolls, forming rolls.
Punches, beaders, rotary machines, stakes, etc.

Factory & Mill Supply Co., Inc.

176 Federal St., - Boston, Mass.

Lathe, 54"x24' engine, triple geared, geared face plate.
Shears, George A. Ohl 8', squaring, ¼" capacity.

Davis Machinery Company

1-3-5 St. Clair St. Toledo, Ohio

Drill, 6 spindle Avey h. s. b. b.
Gear cutter, 48"x12" Gould & Eberhardt, s.p.d.
Grinder, No. 6 Besly, dbl spdl., disc.
Grinder, 16"x42" Landis plain, b.d.
Grinder, 16"x48" Sterling cylindrical, tree, c. s.
Grinders, No. 6 & 10A Bryant chucking, b.d.
Grinder, No. 23 Brown & Sharpe int. cyl.
Header, No. 1 Manville, sgl. stroke, solid die.
Keyseater, No. 2 Mitts & Merrill, b.d.
Lathe, 36"x84" Fitchburg lo swing, s. p. d.
Lathe, 22"x26' Gleason, st. c. gear.
Press, No. 90-D Toledo, dbl. crank, m.d.
Press, No. 54 Toledo, s. s., grd.
Press, No. 91-C Toledo, dbl. crank, gd.
Punch, Long & Allstater multiple.
Screw machine, 1¼" model B Cleveland automatic.
Screw machine, No. 3 Foster hand, b. d.
Screw machine, No. 515 Natl. Acme, 4 spdl. auuto,
Screw machine, 1¼" Cleveland model B automatic.
Screw machine, ¾" Cleveland model B automatic.
Slotter, 16" vertical with 18" rotary table.

Jones Machine Tool Company

Front & Pike Sts., Cincinnati, Ohio

LATHES

18"x8', Nat., q.c., gd. hd.
16x6 Monarch 3S q. c.
18x10 Monarch 3S q. c.
18x8 Lodge & S. Pat. Hd.
24"x10 Niles, l.c.
24"x16' Bradford, l. c.
28x10 New Haven c. d.
30"x10' Niles, l.c.
24x48x14' S & B-dbl. sp.
20"x15' Amer. q change.
24"x22' L. & S. Quick C.
30x18' L. & S. Quick C.

PRESSES

16'—10 ga. Ohl press brk.
No. 5 Bliss (stiles type).
26" throat Wickes punch.
No. 15 Tol. deep throat
No. 92D Tol. dbl. crank.
No. 94C Tol. dbl. crk.
No. 96 B. & B. 48" D. C.
No. 96½ Bliss 48" dbl. cr.
No. 160 Cons. dbl. crank.
No. 44 Niagara dp. thrt,
Robinson s. s. press, 16"
No. 20 Excelsior m. d.
60 N double action.

MISCELLANEOUS

42" Bullard ver. bor. mill.
4' Hammond radial.
48" B. & S. gear cutters.
2—Trundle thrd. millers.
8—Porter Cable lathes
Ingersoll (tub) grinder.
24" Streit pulley lathe.
No. 2 Savage nibbler 36" throat, ¾" cap.
40 k. w. spot weld. 36" th.
150 t. vertical hyd. pr.
2" Reliance bolt cutter.
¼" Schuster wire straigt.
250 ton hyd. wheel press.
38x10 Gray planer 1 hd.
22"x14' Niles planer 1 hd.
No. 3 Van Nor. gr. m. d.
6x26" Fitchburg cyl. gr.

USED AND REBUILT MACHINERY

FOR SALE BY

B. W. Matson Machinery Sales
610 W. Michigan St., Milwaukee, Wis.

Broach, oil gear, XA3 m. d.
Crane, 30 ton 40' span.
Grinder, hob.
Hammers, Bradley helve, 50-75-100 lb., (3).
Pipe machine, Standard, 2½-8" and 15 dies.

The Reeve-Fritts Company
28 N. Clinton St., Chicago

Boring mill, Newark horizontal, 2½" bar.
Grinder, Lumsden face, 12" cup.
Grinder, tool, Gisholt lathe & planer.
Grinder, No. 734 Covel-Hanchett auto. saw.
Pipe mach., 2 spdl. Murchey, 2" cap.

E. L. Klauber Machinery Co.
3221 Olive St. - - St. Louis, Mo.

Automatic, ¾" Cleveland, model B.
Filing machine, Oliver.
Grinders, cutter & tool.
Grinder, disc, 18" Besley, plain.
Hammer, Bradley strap, 30 lb.
Lathes, precision bench, Stark, Elgin.
Miller, No. 1Y Brown & Sharpe, plain.
Radial, 30" Canedy Otto, wall type.
Radial, 24" Carleton sensitive, belt, high speed.
Shear, Quickwork, No. 10A, 60"x14 gauge.
Spot welder, 12 kva Gibb.
Turret lathe, No. 1B Foster, universal.
Turret lathe, Greenlee, 2½"x36".

FOR SALE BY

Wm. C. Johnson & Sons Machinery Co.
1211 Hadley St. St. Louis, Mo.

STEAM HAMMERS

600 - 750 - 800 - 1100 - 1500 - 2000 pound single frame, in good order.

S. M. Regar Machinery and Mill Supplies
Tampa, - - - - Florida

Air compressors, portable and stationary.
Bolt threading machines up to 4" cap.
Broaching machine 3-B LaPointe.
Cutting-off machines and cold saws.
Pipe threading machines up to 12" cap.
Planer, Putnam, 24"x24"x8', stroke 8'.
Planer, Sellers, 36"x36"x10'.
Slotter, 15" Bement Miles, 36" pow. cir. table.
Shaper, 36" Putnam friction feed.
Lathes, drills, all sizes.

Wm. C. Johnson & Sons Machinery Co.
2111 Hadley St. St. Louis, Mo.

Hammers, 3—100 lbs., Bradley.
Press, No. 5 Garrison double crank forging, 6" stroke. 15" die space 49x10" bolster plate, 27,000 lbs.
Presses, 3—Frankfort double crank forging 4½" stroke 10½" die space 34x9½" bolster plate, 13,000 lbs. each.
Presses, 2—No. 5 Garrison double crank forging, 6" str. 15" die space 52½x10" bolster plate 24,000 lbs. ea.
All of above equipped with hot shear blades.
Press, William White No. 15 geared, 1½" stroke.

West Penn Machinery Company
1210 House Building, Pittsburgh, Pa.

Air compressors, 30 to 2500 cubic feet.
Baling press, paper, Logemann, b.d.
Blower, No. 4 Roots, capacity 2110 c. f. m.
Bolt cutters, 1½"-2"-3"-4" Acme, b.d.
Boring mill, 36" Bullard, side head.
Blue print machine, 60" a. c., 110 volt.
Bulldozers, Nos. 2, 4, 6, 9, 26, & 36.
Crusher, jaw, No. 4 Champion, b. d.
Die filer, No. 3 Thiel, m. d.
Drill sharpener, Ing.-Rand "Leyner", 1½".
Drill, radial, 4' Bickford.
Drills, upright 10" to 36".
Drill, No. 24 Foote-Burt, 2", b. d.
Engine, gas, 20 horse power Bessemer.
Gear tester, bevel 18" Gleason.
Generator, plating 6-v. 3500 amps.
Grinder, surface diamond 36"x18".
Grinder, knife 10" Bridgeport, m.d.
Grinder, roll, Farrel 30"x16".
Grinder, surface vertical, 30" table, 16" wheel, m.d.
Grinder, tool & cutter, No. 2 full automatic, m. d.
Hammer, drop board, 500 lb. B. & S.
Hammer, drop board 800 lb. B&S.
Hammers, 50 lb., 75 lb., 100 lb., 200 lb. Upright.
Hammer, 100 lb. Bradley cushioned helve.
Hammers, steam, forging & drop.
Keyseater, No. 2 Mitts & Merrill, 1½x12".
Keyseater, No. 2 Baker, 2"x20", b.d.
Lathes, speed, 11" and 13" Blount, m. d.
Lathe, brass 18x6", friction head, power feed, b. d.
Lathe, 7"x32" P&W, precision, m.d.
Lathe, 7"x30" Dalton, t.a.
Lathe, 18"x8' Bullard, b. d.
Lathe, 42"x20' New Haven, geared head, m. d.
Lathe, roll, 54"x20' std., m. d.
Lathes, turret, Nos. 1, 2 and 3 W. & S., b. d.
Locomotive, gas, 6 ton Milwaukee, 36".
Miller, hand, No. 6 Whitney, m.d.
Miller, shaper, duplex, No. 14 Cochrane-Bly, m.d.
Miller, vertical, Burke, table, 16x6, b. d.
Miller, spline, P&W, double, 2"
Nibbler, No. 1 Campbell 3/16", 6" gap, m. d.
Nibbler, L. & A., 6"-36" throat, m.d.
Pipe mche., 2", 4", 8", 8"-12" & 16" Landis-Oster-Williams.
Presses, horning, Nos. 38 & 39½ Bliss, b. d.
Press, arch, No. 30 Bliss, b.d.
Press, No. 19 Bliss o.b.i., b.d.
Press, o.b.i. 50 ton Garrison, geared.
Presses, Stiles, type, 1½ and 3½" m. d.
Press, knuckle joint, 75 ton Howard.
Punch, "EF" Clev. D. E., 36" gap 1½"-1".
Punch, No. 6 L & A, 4"-6", m.d.
Punch, horiz., 1"-1" Cleveland, m.d.
Pump, 1500 lb. Triplex vert., 15 gal., m. d.
Riveters, air, hammer, spinning.
Saw, metal band, 10"x10" Napier.
Saw, hack 6x6 Racine, b.d.
Saw, friction No. 1 Ryerson 220/3/40.
Shapers, 16", 20", 24" & 36" Gould & Eberhardt.
Shears, alligator, 1½", 2", 3", 4" & 6".
Shear, up-cut, 22" Aetna, m. d.
Shear, 10'x14 ga. Niagara, m.d.
Shear, Rotary ¾" Newbold, 50" gap.
Slotter, 12" Putnam, b.d.
Straightener, McKay 17 roll, 4" dia., m.d.
Straighteners, 1½" & 3" Sutton, m.d.
Straightener, 60", 11 roll, 1¼" dia.
Straightener, 75 ton hyd., 10' bed.
Testing machine, 400,000 lb. Riehle, b. d.
Tumbling barrel, 24"x48", belt drive.
Upsetters, 1" to 6".
Woodworker, universal Parker, m. d.

Porter-Cable Machine Company
Syracuse, New York

Gisholt dynamic balancer. Capacity 24" diameter x 40" long. In excellent working conditon.

W. L. Steege Mchry. Co.,
100 S. Jefferson St., - Chicago, Ill.

Gear cutter, No. 326 Brown & Sharpe.
Grinder, 16x32 Landis crankshaft.
Hammers, 50 lb. and 60 lb. Bradley.
Lathe, pulley, 32" Cincinnati.
Lathe, pulley, 60" Niles.
Milling machine, No. 1 Pratt & Whitney.
Piston maker, Cone auto.
Welder, spot, Toledo 25 KW.

North Machine Tool Corporation
179 Lafayette St., New York, N. Y.
WOrth 4-5690

Automatics, Clev. model B, 7/8" single spindle, (3).
Automatics, Clev. model A, 2", single spindle, (3).
Automatic, No. 55 Acme 1¼", 4 spindles.
Automatic die cutting mach., Keller w. 2 motors.
Drill, 4 spl. superspeed b.b., Fosdick 13", 8" cap.
Drill, 6 spl. superspeed b b., Fosdick 13", 8" cap.
Gear cutter, 36" Brown & Sharpe.
Gear cutter, 18" Gleason, straight bevel generator.
Grinder No. 1 Cincinnati univ. tool.
Grinder, No. 205 Rivett internal w. 2 motors.
Grinder, tool, Gisholt univ.
Grinder, 12" Pratt & Whitney, vert. surf. w. motor.
Lathe, 7" x32" Pratt & Whitney bench.
Lathe, 14" x8' Monarch, q.c.g.
Lathe, 16" x8' Sidney, q.c.g.
Lathe, 18" x8, Monarch, q.c.g.
Lathe, 20" x12' Monarch, q.c.g.
Lathe, 30" x40" Rahn Larmon, ext. bed gap, g. h., m.d.
Miller, Hendey Lincoln type.
Millers, No. 2 Wabeek swivel hd., univ., (2 new).
Millers, No. 12 Brown & Sharpe, (3).
Shaper, 15" American.
Shaper, 36" Ohio.
Turret lathe, 2" x24" Jones & Lamson, grd. head.
Turret lathe, 24" Gisholt, 3⅜" hole through spindle.
Turret lathe, 36" Gisholt, 4¼" hole through spindle.

WANTED

Write Box 441, Owatonna, Minnesota

Spot welder, power press brake, D.&K. or Version, from 3 to 6', for light work 18 gauge, motor driven., about 15 KVA.

Under Writers Fire Pump
18-10-12-1000 gal. per minute. Steam driven.
Made by Buffalo Steam Pump Co.
MORRIS MACHINERY CO.
Newark, N. J.

WANTED

TAPS-TWIST DRILLS-FILES
CUTTERS-ENDMILLS-SAWS
HACK SAW BLADES

WE WILL BUY YOUR SURPLUS TOOLS

SURPLUS TOOL EXCHANGE
619 W. Randolph St., Chicago, Illinois
SURPLUS BOUGHT AND SOLD

WANTED

METRIC GAUGE SET

81 Pieces or smaller
for urgent defense work

P.O. Drawer "D", Brightwood Station
Springfield, Mass.

NEW INDEPENDENT LATHE CHUCKS
IMMEDIATE DELIVERY

		NET PRICE
18"—4 Jaw	Independent Chucks	$ 98.00
20"—4 Jaw	Independent Chucks	112.00
24"—4 Jaw	Independent Chucks	146.00
8"—4 Jaw	Independent Chucks	160.00
32"—4 Jaw	Independent Chucks	225.00
36"—4 Jaw	Independent Chucks	275.00

James W. George Machinery Co.
3146 E. Jefferson Ave.,
Detroit, Mich.

ELECTRIC HOISTS

IMMEDIATE DELIVERY

¼, ½, 1, 2, 3, 6 ton capacity

Universal Machinery Co.
1046 W. Van Buren St., Chicago

HIGH SPEED CUTTING TOOLS

BOUGHT AND SOLD

MILLING CUTTERS, TWIST DRILLS, ENDMILLS, REAMERS, SLITTING SAWS,

AMERICAN TOOL SALVAGE CORPORATION

100 S. Jefferson St., Chicago, Ill.

NO PRIORITIES NEEDED

Save Money. Immediate Delivery--- on used steel & wood pulleys; ball & roller bearing hangers. Rebuilt used leather belting.

Passman Bros.

1101 W. Lake St., Chicago, Ill.

Prompt Service of Quality

Superior Salvage Co.

4917 Barkwill Ave., Cleveland, Ohio

WANTED

Fitchburg Lo-Swing Lathe
8" Swing, 60" Centers
preferred

Motor Sales & Service Company

461 Brunswick Ave., Trenton, N. J.

IMMEDIATE DELIVERY

Boring Mill, 48" Bement Miles
Planer, Patch, 60x42x16, 4 Heads
Planer, Bedford Openside, 42x42x15
Turret Lathe, Jones & Lamson 2x24
Lathe, Niles 26x16
Lathe, Greaves & Klusman 16"x8' Semi Q.C.
Shear, Power, 42", ¼" Capacity
Mill, Vertical, No. 2 Becker
Shaper, 20" Juengst
Shaper, 12" Gould & Eberhardt
Automatic, ¾" Cleveland
Hand Mill, No. 1 Van Norman

UNIVERSAL MACHINERY CO.

1046 W. Van Buren St., Chicago, Ill.

FOR SALE — GOOD TOOLS

Auto., Cleveland 2" Model "B," 28784 ..... **$2250.**
Gear Cutter, No. 6 B. & S., Cap. 60"x11" ..... **$3000.**
Lathe, 14"x5' Hendey, Q.C., Pan, Chuck, B. D. ..... **$950.**
Lathe, 14"x6' LeBlond, Q.C., B.D. .... **$1250.**
Lathe, 20x8 Hamilton, Hvy. Pattern, Q.C., Taper, Draw in Collets, Chuck & Countershaft ..... **$2700.**
Lathe, 20-40"x16" Rahn Larmon, Sliding Bed Gap, Q. C. M.D. ..... **$3000.**
Lathe, 48"x20' Fifield, Pl., Ch., Raised to 60" ..... **$4000.**
Press, No. 126 Max Ams O.B.I. 1" str. **$325.**
Shaper, 14" Steptoe, SG., Vise & Motor ..... **$1000.**
Shaper, 16" Steptoe, B.G., Vise & C. S. ..... **$1050.**

BANSBACH MACHINERY CORP.

3911 West Madison Street, Chicago
Kedzie 0212

SELLING FOR CUSTOMER

Brake, 10' Whitney-Jensen, No. 14 Ga., with 24" of fingers ..... **$810.**
Drill, Garvin, 00S, Duplex, ⅜" Cap. B.D. ..... **$800.**
Drill, Garvin, 1S, Duplex, 1⅛" Cap. B.D. ..... **$700.**
Lathe, Willard 13x6, SQC with chuck, belt drive ..... **$425.**
Lathe, Hendey 19x8, QC with taper attachment ..... **$1800.**
Miller, 48" Oesterlein, Rotary Tilted, M.D. ..... **$4000.**
Honing Machine, New Carlin ¼ to 2", M.D. **$1017.50**
Honing Machine, Hutto, 8' radial arm, motor drive ..... **$2000.**
Press, Hydraulic, Hannifin, 20 ton arbor, C frame, motor drive complete.... **$450.**
Slitter, Yoder, G 48", Gang, M.D. with Grinder ..... **$3000.**

BANSBACH MACHINERY CORP.

3911 W. Madison St., Chicago, Ill.
Tel. KED. 0212

EMCO REBUILT

PLAIN CYLINDRICAL GRINDERS

10x18" No. 14 Brown & Sharpe
10x24" Landis, m.d.
10x30" Queen City, m.d.
10x36" Landis Integral Cam, m.d.
10x36" Norton, m.d.
10x50" Norton, m.d.
10x52" Landis, m.d.
10x72" Norton, m.d.
12x36" Cincinnati, m.d.
12x36" Cincinnati, belt
12x36" Modern, belt
12x36" Modern, m.d.
12x42" Landis, belt
12x48" Modern, m.d.
14x50" Norton, m.d.
18x72" Cincinnati Automotive Parts, m.d.

UNIVERSAL CYLINDRICAL GRINDERS

12x42" Modern, belt

GRINDERS

Cincinnati Valve Seat Grinder, 2 m.d.
No. 10 Bryant Internal
No. 50 Heald Cylinder, hydraulic
No. 55, 60, 65 Heald Cylinder
No. 1 Fraser Lapper
54" Bridgeport Knife
No. 4 Gardner Disc
No. 6 Diamond Disc
No. 20 Gardner B.B. Combination Disc and Sander
No. 120 Gardner Double Disc
No. 120 Gardner Combination Disc
Rockford Wet Emery Grinder
Springfield Wet Emery Grinder, m.d.
Hisey-Wolf B.B. Polishing Stand, m.d.
Mitchell Type A1 Polishing Stand
U.S. Elec. Tool Polishing Stand, m.d.

TOOL & CUTTER GRINDERS

No. 3 Brown & Sharpe Universal Cutter & Reamer, belt
No. 4 Oliver Motor Driven Drill Pointer
Gisholt Universal Tool Grinder, belt
Gleason Cutter Grinder, belt
Gould & Eberhardt Gear Cutter Grinder, belt
Modern Chaser Grinder, belt
Yankee Drill Grinder, belt

BORING MILLS

30" Colburn, 1 head
48" Niles-Bement-Pond Car Wheel Borer, m.d., facing attach.
48" Niles-Bement-Pond Car Wheel Borer, belt

BROACHING MACHINES

Cincinnati Mill Broach, m.d., new
No. 2 LaPointe of Hudson
No. 2 J. N. LaPointe, m.d. thru gear box (2)
No. 3 J. N. LaPointe Double, belt (5)

PLANERS

30"x30"x8' Cincinnati, belt, 1 head

PRESSES

Waterbury-Farrel S.C. O.B.
D2 Ferracute S.A. Drawing
P2 Ferracute Stiles
No. 6 Waterbury-Farrel D.C.
S51 Ferracute D.C.
No. 268¼B Toledo D.C. Toggle Drawing 29" stroke, weight 175,000 lbs.
No. 496D Toledo D.C. Toggle Drawing, 17 stroke, weight 160,000 lbs.
No. 0 Springfield Bench Type Straighting
Metalwood Hydro-Pneumatic type B45
Metalwood Hydro-Pneumatic type B33
300 ton Caldwell Hydraulic Wheel Press
30 ton Lourie type BX

MISCELLANEOUS

17x21" Lentz Steam Engine, direct connected to 200 KVA Allis-Chalmers, 24 volts A.C. Generator
Gisholt Precision Balancing Machine, m.d.
Norton Running Balance Indicating Machine, m.d.
No. 5 Williams & White Bulldozer, belt
250 H.P. Sprague Electric Co. Electric Dynamometer Laboratory Test
No. 22 Williams & White Eye Bender, m.d.
No. 2 Cochrane-Bly Filing Machine, belt
No. 1 Fischer Oil Groover, belt
No. 1 Fischer Oil Groover, m.d.
Production Polishing Machine, belt
Blevney Polishing Machine, belt
Wagner Saw Sharpener, belt
No. 11 Cochrane-Bly Saw Sharpener, m.d.
No. 11S Cochrane-Bly Saw Sharpener, m.d.
No. 1 Leighton Type Straightening Machine, m.d., new (2)
¼", ⅜" Shuster Wire Straighteners

MILLING MACHINES

No. 2 Knight
Newton C17 Vertical Slab
6x14" Pratt & Whitney Thread
24"x24"x6" Ingersoll Slab
36"x36"x14" Bement Slab
40" Ohio Tilted Rotary

AUTOMATICS

⅜-½" Cleveland Model B, m.d.
⅞" Cleveland Model A
4 spindle ⅞" Cleveland Model M
1¼" Hartford
1¼"-1½" Cleveland Model B
No. 6D Potter & Johnston Automatic

BOLT THREADING MACHINES

9/16" Landis 2 spindle, m.d.
2 spindle 1" Acme Class A
3 spindle 1" Acme
1" Landis
2" Landis
2½" Acme
No. 11S Rickert-Shafer Auto. Threading
1¼" American Bolt Heading

Many other machines in stock.

THE EASTERN

1001 TENNESSEE AVENUE,

MACHINE TOOLS

4 **PIPE THREADING MACHINES**
. 2 Bignall & Keeler, m.d.
Bignall & Keeler, belt
No. 70 Jarecki, m.d.
4 Bignall & Keeler, m.d.
Eaton, Cole & Burnham, belt
Merrell, belt
Oster, m.d.
" Cox, belt

WELDERS
KW Federal Spot, type No. 34 6B, cap. 2 pces. ¼"
0 amp. Lincoln Stable Arc
0 amp. Lincoln Stable Arc
0 amp. General Electric Arc
0 amp. Hobart Arc with Chrysler Engine

MULTIPLE SPINDLE DRILLS
spindle 24" Barnes All Geared Self-Oil.
spindle National Acme Semi-Automatic Horizontal
. 00S Garvin Horizontal Duplex
. 1 Pratt & Whitney 2 spindle Gun Bar.
Fox Straight Line, 7 spindles
. 2 Bausch Hydraulic, 38x21" head
. 2 Bausch, 17x32" head
. 2 Bausch, 16x30" head
. 3 Bausch, 16x30" head
. 2D Moline 2 spindle Hole Hog
1 Fox, 20x14" head
. 15HC Fox Hydraulic
. 26C Fox Tapper
. 37 Natco, 22x30" head
. 51C Harrington, 22" square head

BALL BEARING DRILLS
spindle Henry & Wright
spindle Special Avey
spindle Barr
spindle Allen
spindle No. 2 Fosdick, p.f.
spindle Gardam
spindle Henry & Wright Class K
spindle Henry & Wright Class B
spindle Kokomo
spindle Henry & Wright
spindle Barr

RADIAL DRILLS
½' Avey Sensitive
American Sensitive
Carlton Sensitive
Hammond Jack Knife
Fosdick Plain
½' Niles Semi-Universal
Niles Universal, gear box

ENGINE LATHES
" raised to 28"x10' Reed
"x12' Barker
"x16' Reed
"x8' Fay Scott
"x10' Davis
"x10' Pond
"x12' Bradford
"x13' Niles
22"x16' centers American 100 H.P. Input Super Lathe, geared head, with 100 H.P. D.C. Variable Speed Motor, weight 65,000 lbs.
22"x18' Niles
24"x8'6"Bridgeford
24"x10' Bridgeford
24'x10' Whitcomb-Blaisdell
24"x11' Chard
24"x16' Schumacher-Boye
26"x16' Bette-Bridgeford, taper
30"x14' Hamilton

MANUFACTURING LATHES
3x80" Lo Swing
8x36" Lo Swing
11"x4' F. E. Wells
15"x6' Automatic Threading Lathes (3)
16"x6' Rockford Semi-Quick Mig.
18"x8' Chard Production
20"x8' American Turret
30" Straight Pulley Turning Lathe
Niles-Bement-Pond Axle Lathe, cone
42x96" Niles-Bement-Pond Car Wheel Lathe, m.d., new
Niles-Bement-Pond Quartering Machine, m.d., new

SHAPERS
16" Hendey Friction Type
20" Ohio Back Geared, gear box
24", 28' Ohio, Drive All gear box
32" Morton Railroad Type Draw Cut, m.d.
32" Gould & Eberhardt, m.d.

TURRET LATHES AND SCREW MACHINES
No. 0 Brown & Sharpe Hand, cone
2¼"x24" Jones & Lamson, bar feed
3x36" Jones & Lamson, bar feed
3x36" Jones & Lamson, chucking
2 spindle 3x36" Jones & Lamson, chucking
18" Libby Type A, no cross slide
Woods Tilted Turret, cone

SHEET METAL MACHINERY
No. 25S 2x14 Quickwork Rotary Shear, m.d., ¼" cap.
No. 34 Lennox Rotary Bevel Shear, cap. ¾"
Niagara Circle Shear, 16 ga.
Southwark Rotary Metal Cutter, s.p.d., cap. ⅜"
8' Niagara 18 ga. Foot Power Shear
7' Hand Brake, 18 ga.
McCabe Pneumatic Flanger, ½" cap.
Niles-Bement-Pond 8' Hand Flanger
Niles-Bement-Pond 10' Hand Flanger
No. 1 Campbell Nibbler, 3/16" cap.
No. 2 Campbell Nibbler, ⅜" cap.
No. 4E Universal Trimmer
Magee Sheet Metal Wiring & Edging Machine
No. 10A Quickwork Double Seamer

SLOTTERS
18" Niles Slotter
84" Newton Slotter

Let us quote on your requirements.

MACHINERY CO.,
CINCINNATI, OHIO

QUICK

CLEARING CRANKLESS TRIPLE ACTION PRESS

4 Point Suspension Type
Combined capacity blankholder and plunger slide 1350 tons
Bed 84"x133"

PRESSES—STRAIGHT SIDE

No. 59¼ TOLEDO, 12" Stroke, 25" die space
No. 75½ BLISS, B.G. 5" stroke

PRESSES—DOUBLE CRANK

NO. 97-H TOLEDO DOUBLE CRANK — Distance Between Housings 173"; Bed area 60"x173"; 10" stroke; approx. 650 tons; Weight 245,000 lbs.

No. 9610¼ HAMILTON, 10" Shaft, 10" Str., 97" between housings, M.D.
No. 7-C BLISS, 66" Bet., M.D.; 7¾" Stroke
No. 85-D TOLEDO, 10" Str., M.D.
No. 884 CHICAGO STEEL, 12" Stroke, 86" Between Housings, 8" Shaft

ALL MOTOR DRIVEN—TIE ROD
No. 60-D-84 CLEVELAND, 16" str.; 6" shaft; Bed 48x85"; D. B. G.; 16" Die space
No. 6-E BLISS, 8" Str. & Shaft; 108" Bet., Air Cushions
No. 154G CLEVELAND, 84" between housings
No.94-G & No. 95-G TOLEDOS, 14" & 11" Strs.
No. 92½E TOLEDO, 8" str.; Bed area 32x60"
No. 93-E TOLEDO, 12" str.; Bed area 36x60"
No. 93-H TOLEDO, 12" str.; Bed area 42"x84"
No. 93½-F TOLEDO, 6" str.; Bed area 36"x66"

PRESSES—DOUBLE CRANK—GAP FRAME

Nos. 205-E TOLEDO, B.G. 4" Str., Bed 72"x26"
Nos. 202-D & 202-E TOLEDO, 5" strokes
Nos. 206-F TOLEDO, 87" between housings
Nos. 173-B & 174-B BLISS CONSOLIDATEDS

PRESSES—TOGGLE

No. 178 TOLEDO Single Crank, 50" bet. housings, 10" Shaft; Stroke of Plunger 26"; Stroke of Blankholder 18"
No. 406B BLISS DOUBLE CRANK TOGGLE DRAWING—84" bet. housings; Twin drive; 25" plunger stroke; 86" die space; 8" shaft
No. 3½B BLISS, 15" Stroke of plunger

PRESSES—HORN

No. 24 BLISS CONS. B.G. & flwheel
No. 14 TOLEDO, B.G., No. 14½ TOLEDO
No. 16 BLISS, 2" Str., No. 42 TOLEDO
No. C-A-4 FERRACUTE, 4" Stroke

PRESSES OBI

Nos. 6, 5½, 5, & 4 CONSOLIDATEDS
No. 5½ WALSH, No. 4-S ROBINSON
NOS. 5, 4, 3, & 2 TOLEDOS
No. 4 V & O BG., 7" Stroke
NEW B & J PRESSES WITH PRIORITY

PRESS BRAKES

OHL: 10'14 ga.; 12'10 ga.; 6'7/32"; 4'16 ga.; 5'14 ga.
CHICAGO STEEL: 6'14 ga.; 66" 14 ga.; NEW NOS. 235 & 335 (with priority)
CINCINNATI—4' ¼"

PRESSES—MISCELLANEOUS

ARCH: No. 04 LEFFLER, 2" Stroke
No. 69 HOLDEN, 2½" Stroke; No. 406-A ADRIANCE, 5" Stroke, B.G.
OPEN BACK GAP FRAME: No. 75 CONSOLIDATED, B.G.; No. 7 PERKINS, 1½" Stroke
No. 6 R & K Style N, 4" Stroke, B.G.
No. 75 TOLEDO, 3" Stroke; 4" Shaft; M.D.
No. 78 TOLEDO, 3½" Stroke; No. 68 WOLD
EMBOSSING: 150 Ton FERRACUTE
STRIP FEED: No. 31-C McDONALD

INTERSTATE

DELIVERY!

AUTOMATIC SCREW MACHINES

5—No. 00 Brown & Sharpe Turret Formers

WOOD SCREW MACHINES

No. 2 for wood screws No. 8 to No. 20 length from ⅝" to 3½"
No. 3 for wood screws No. 12 to 30 length from ¾" to 6"

BULLDOZERS

NO. 8 WILLIAMS & WHITE, Cross head 15" high and 72" long; No. 2 Williams & White
RYERSON KLING DOUBLE END; 14' bed; B.D.
WALBURN-SWENSON; 12" stroke; Motor Dr.
NO. 4 LONG & ALSTATTER; 10" stroke

GRINDERS

DISC: No. 24 Gardner, 53" disc, B.D.
No. 16 Besly, 30" discs
SURFACE: No. 3 Brown & Sharpe Planer Type
No. 3 WILMARTH & MORMAN, Table 8x24"
KNIFE: 84" PLYMOUTH & 61" SEYBOLD

GEAR MACHINERY

NO. 36S GOULD & EBERHARDT
NO. 6-A CINCINNATI, 72"x20"
NO. 6 FELLOWS Gear Shaper

HAMMERS

Standard Automatic Drop

3—No. 2—200 lb. 1—No. 4—400 lb.
1—No. 1—100 lb. 1—No. ½—50 lb.

Board Drop

800 lb. & 1000 lb. WILLIAMS & WHITE & BLISS

FLOOR LATHES

30 FT. PIT LATHE; FACE PLATE DIA. 156"; QUADRUPLE GEARED; INTERNAL FACE PLATE DRIVE

28/46"x20' SCHUMACHER & BOYE; DOUBLE SPINDLE; Back Geared
52"x22 FT. FIFIELD, Triple back geared
30"x16 FT. FIFIELD LCG., Back geared
28/48"x13' HARRINGTON Gap
26"x18' DRAPER, B.G.
24"x15 FT. NEW HAVEN, LCG., Back geared
24"/44"x16 FT. McCABE DOUBLE SPINDLE
22"x10' AMERICAN, Gd. Hd.
20"x10' ADVANCE, Q.C.G., D.B.G.
21"x18' RYERSON-PHOENIX
14"x12' CARROLL JAMIESON
14"x6' BRADFORD & SOUTH BEND
TURRET: 28" POND

SPINNING LATHES

2¼" BLISS, NO. 6 BLISS 30" swing
No. 32S TOLEDO BB, 30" swing

MILLS

No. ½ VAN NORMAN DUPLEX; Motor drive
No. 1 KNIGHT VERT.; No. 3 PRATT & WHITNEY DIE SINKER; BILTON CAM MILLER

SINGLE END PUNCHES

No. 2—HILLES & JONES Horiz. Cap. 1" thru 1"; L & A Beam Punch
ROCK RIVER Punch & Shear 14" thr.
No. 15 WILLIAMS & WHITE, 24" thr.

GANG PUNCHES

12' L. & A.; Wgt. 100,000 lbs.
NO. 2 LONG & ALLSTATTER, 74" bet. hgs.
NO. 5 BERTSCH, 64" between housings
BERTSCH—51½" between housings; Motor Dr.
2—No. 10 WELLS, 1—34" between 1—73" bet.

ROLLER DIE MACHINES

5, 6, 7 & 8 Spindle

ROLLER LEVELERS

50" HILLES & JONES—54" McKAY

RIVETERS

STAKE & PUNCH: Rock River, 36" thru., B.D.
No. 6 WHITING; ⅝" rivet hot, 50" throat
PNEUMATIC: Hanna Deep Gap Jaw, 18" gap.

FRICTION SAWS

No. 2, 3, 4 RYERSON, Power Feed

ROTARY SHEARS

No. 36M MARSHALLTOWN Lennox Bevel ¾"
No. 10 QUICKWORK; 60" throat 14 ga. cap.
No. 3 QUICKWORK; 36" throat 3/16" cap.

PIPE THREADERS

12" LANDIS, Cap. 4"-12"; 8 spindle speeds;
12" STANDARD-WIELAND, Cap. 4"-12"
6" SAUNDERS, Landis Die Head

UPSETTER

3½" AJAX, Single geared; Steel Bed; 10" stroke; Weight approximately 40,000 lbs.

—SPECIAL ITEMS—

BORING MILLS

72" BICKFORD, 52" NBP, M.D.

RADIAL DRILLS

3' FOSDICK; 4' AMERICAN; 6' FOSDICK & WESTERN

SHAPERS

20" & 24" GOULD & EBERHARDT
12" NEW HAVEN VERTICAL SLOTTER

MILL

No. 4S PRODUCTOMATIC

SHEARS

12'14 GA.; 10'14 GA.; 52"14 GA.; 8¼" LOY & NAWRATH
6x6x⅜" LONG & ALLSTATTER ANGLE SHEAR
10 GA. NIAGARA CIRCLE SHEAR & FLANGER

ROLL

7½' NIAGARA, 3/16" CAPACITY

MISCELLANEOUS

GANG SLITTERS: 72" YODER, 5" dia. shaft; 8" dia. cutters; M.D.
SCRAP BALER: GALLAND & HENNING HYD.; 60"x24"x18", with 30 HP motor, Hopper, Compressor, Pump and Tank
SEAMERS: No. 3 BLISS; No. 12S ADRIANCE
TAPPERS: Nos. 4 & 8 PNEUMATIC GATERMAN; No. 1 Garvin; ⅝" cap. Gaterman

Machinery Co., Inc.

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WHY RETIRE YOUR OLD TOOLS: WE CAN REBUILD THEM AND MODERNIZE THEM FOR TODAY'S TASKS AT OUR NEW REBUILDING PLANT, 433 BRYANT AVE., BRONX—WOrth 4-7960. *SEND US FULL DETAILS*—WE WILL BE GLAD TO HAVE OUR ENGINEER INSPECT THEM AND AND SUBMIT QUOTATION.

PARTIAL LISTING OF MACHINES IN STOCK.
CAN BE REBUILT AND MOTORIZED TO YOUR SPECIFICATIONS.

PLANERS: BETTS 30"x30"x10' Closed side
CLEVELAND 42"x42"x12' Closed side
D & H 48"x48"x21' Open side

TURRET LATHES: J & L Hartness sliding head—2
DRAPER 20" axel turning lathe

ENGINE LATHES: LEBLOND 1¼" cap. adapted for turret
LODGE & DAVIS 1¼" capacity
PUTNAM 24"x16'
LODGE & SHIPLEY 16"x10' geared head

FLATHER 16"x6'
DAVIS FURBER, H.D.

DRILLS: PUTNAM Vert. 36"
DIAMOND 10" cap.
Comb. drilling, milling and tapping machine, Hor. or Vert.

CYL. GRINDERS: No. 3 MODERN Univ. (5)

SURF. GRINDER: 14" PRATT & WHITNEY ball bearing

SHAPERS: 16" GOULD & EBERHARDT (2)
24" CINCINNATI, heavy duty

READY TO SHIP

LANDIS BOLT THREADING MACHINES
1½" capacity 1 and 2 Spindles. Motor Drive.
OHL POWER SQUARING SHEAR, 10 ft. by 10 gage.
REID No. 3 SURFACE GRINDERS capacity 32"x12"x12" Motor Drive.
FELLOWS GEAR SHAPERS 24" and No. 3.
LEBLOND 29" and 12' SCREW CUTTING LATHE Removable Ga, Dbl. Back Gears.
PRATT & WHITNEY No. 12 Two Spindle Profiler.
BROWN & SHARPE No. 0Y MILLER geared Speeds Motor Drive.

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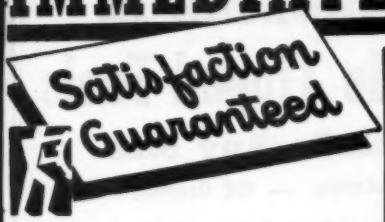

DRILLS
21" Cinc. Bick. Box
Col. Prod., m.d. & m., p.f. to spdl., 2 Buhr adj. hds.
Fox Mult. Spdl. with tap. att. (6)
Kingsbury 4 spdle., auto. index device
21" Rockf. Drills (2)
21" Minster Drill
Natco Rotary Drill 6-spindle
5 Spdle. Detroit
Foote Burt Mult. Sp. Drill m.d. (5)
3' Western Radial Drill, heavy duty

GEAR EQUIP.
No. 36ST Gould & Eberh. Gr. Gash.
No. 5A Lees Bradner Hobbers (3)
W. & W. Gr. Cutter, 96" dia. x 52" fa.

GRINDERS
Nos. 55 & 60 Heald Internal
No. 1 Osterholm fa.
No. 126 Gardner dbl. spdl. hyd. fd.
No. 20 Bryant Int. 16" x 36" Cinc. Pl. Cylinder

LATHES
34"x11' Wickes Crankshaft, (2)
13x5' Pratt & Whitney, motor drive
21"x24 Jones & L. Flat Turret
36"x36" Jones & Lamson m.d. & m.

MILLS
No. 3 Craftsm. Rot. Production
54" Ingers. Rotary, 3 hd., m.d.
66" Newton Rotary, motor driven
Trundle Thread Mill
Ingersoll Mill

WELDERS
150 KW Fed., m.d.
Taylor Win. 4-way flash
150 KVA Fed. Seam Welder

MISCELLANEOUS
Automatics, ⅞" Model G Gridley
Balancer, 18" Gisholt Static (2)
Boltcutter, Nat'l. 2-spdle., 1½" cap.
Broach, 6-ton Amer. Vert. Hyd. m.d.
Bulldozer, No. 5 Williams & White
Core Blowers, No. 6 Demmler, (3)
Furnace, Gen. Elec., 15 KW., 110 volt
Hammer, Bradley 15 lb.
Rivet Heaters, Berwick (4)
Shear, Pels Comb. m.d. I beams 6"x 12"
Slitter, 42" Yoder
Trucks, Elwell Parker Elec. Mule
3 ton Auto. Hi-Lift
Upsetter, 1½" Acme Steel Bed
Upsetter, 1½" Ajax
Wire Strnrs., 3/16" Shuster to 20'
X-Ray Mach., Gen. Elec. 250,000 V. cap. 2⅝" solid steel
5A High Speed Riveting Hammer

JUST RELEASED

No. 24 Williams & White D.C. gap frame Press, 7½" cr.

PRESSES
6C Rockford DC SS Press 4½" cr.
No. 3A Bliss O.B.I., str. 1½", M.D. & M. (2)
No. 4 Toledo, O.B.I., Presses (2)
No. 4½-1 Cleve. OBI. Str. 2", MD. & M.
No. 3A Bliss Horn., str. 3½", arr. for grd. M.D. & M.
No. 24 Stoll Horn., str. 2", MD. & M.
No. P3" Ferracute, str. 1½", grd. m.d. & motor
Verson Gap, 3" str. grd. M.D. & M.
No. P2, 4 Ferracute motor drive

WELDERS
Multi-Hydromatic (2)
Fedl. Welder, 25 KW
Ford Spot, 40 KVA, m.d. & m.
Taylor Winfield Spot, 33 KVA, Type S-184
Agnew Spot, Type 10-D, (2)
Federal Spot, 40 Kw, Type 420B, (2)
Thomson Butt, 3
Taylor Spot, 47 Kva, Type S-364
Taylor Winfield Spot, 15 KVA, Type W-12-2
Taylor Winfield Spot, 20 KVA, Type N-6-2½, m.d. & m.
Federal Butt, 45 Kw, Type 6AA
Federal Butt, 65 Kw, 10A, m.d. & m.
Federal Butt, 35 or 40 KW, m.d.

RIVETERS
Thomkins John., Mod. A8E, m.d. & m., (3)
Chge., No. 14-68, m. d. & m., (3)
Grant No. 120, m.d. & m.
Penn, Style C-22, md. Chicago, size 9/64

ROLL FORMING MACHINES and CUT-OFF MACH.
Yoder 8 spdle., m.d. & motor
Yoder Tube, 14 sp. m.d. & m.
Yoder Cutoff, with M TR, Type LO (2)

BULLDOZERS.
No. 23 Williams & White, m.d. & m.
No. 22 Williams & White, m.d. & m., (2)
No. 2 Williams & White, m.d. & m.
No. 4 Williams & White, m.d. & m.

TUBE BENDERS
Williams & White, m. d. & m., (5)

MISCELLANEOUS
Bostitch Stitch. Mch., Type No. HA, m. d. & motor
Buffer, Udyma. Auto, m.d. & m.
Die Press, Seelye, Style A, bed 14"x 67"
Drill, 15" Barnes, m.d. & m.
Tackers, No. 4 Heller, foot operated
Ross Clinch Nut Mch, S-1, m.d. & m.
Mill, Burke Hand, m. drive
Punch, Niagara

SLEEPER & HARTLEY SPRING COILERS
No. 2½ Series 332 Universal Clutch Type, motor drive (2)
No 1½ Series 346 Universal Clutch Type, motor drive & motor
No. 1 Series 288 Universal Segment Type
No. 3 Series 261 Univ. Segment Type, md.
No. 3½ Series 434 Universal Segment Type, motor drive & motor

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VICTOR'S BARGAINS IN

Tungsten Carbide Tipped Tools

Price $1.00 Each In Any Size

New Low Prices. — Increase Production — Cut Operating Costs

Tools are tipped with Tungsten Carbide, and are suitable for machining cast-iron, brass, bronze, aluminum, non-ferrous materials (such as hard rubber, bakelite, fibre), and tough alloy steels up to 500 Brinell hardness.

Left—100 Series

Left Hand-Reverse Image, Right Hand Shown

Tool No. RH	LH	Shank Size
R-100	L-100	¼x¼x2
R-101	L-102	5/16x5/16x2¼
R-103	L-104	⅜x⅜x2½
R-105	L-106	7/16x7/16x3
R-107	L-108	½x½x3½

Right—200 Series

Tool No.	Shank Size
200	¼x¼x3
201	5/16x5/16x2¼
202	⅜x⅜x2½
203	7/16x7/16x3
204	½x½x3½

Below—300 Series

Tool No.	Shank Size
300	¼x¼x2
301	5/16x5/16x2½
302	⅜x⅜x2½
303	½x½x3½

STANDARD TUNGSTEN CARBIDE TIPPED TOOL BITS

In lots of 12 assorted in any Series; 100-200-300 Series an extra 10% will be allowed; also in lot of 50 assorted 20% discount will be allowed.

Sizes not listed as well as special TIPPED TOOLS will be quoted upon request. When ordering, state tool number and quantity desired.

We Carry Silicon Carbide Emery Wheels for Grinding Tungsten Carbide Tool Bits

SEND FOR OUR CIRCULARS

Victor Machinery Exchange, Inc.

251 CENTRE STREET **NEW YORK, N. Y.**

LONG LENGTH HIGH SPEED DRILLS

9" Cutting Flute
12" Long

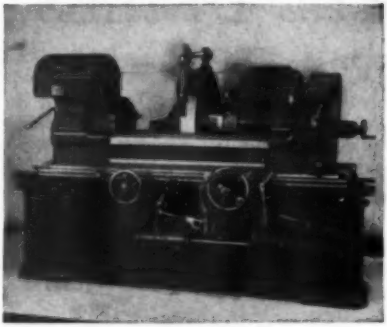
Size Inches	Length Overall Inches	Length of Flute Inches	Our Price Net Each High Speed
3/16	12"	9"	$3.00
13/64	12	9	3.25
7/32	12	9	3.25
15/64	12	9	3.25
¼	12	9	3.50
17/64	12	9	3.50
9/32	12	9	3.50
19/64	12	9	3.50
5/16	12	9	3.75
21/64	12	9	3.75
11/32	12	9	3.75
23/64	12	9	3.75
⅜	12	9	4.00
25/64	12	9	4.00
13/32	12	9	4.25
27/64	12	9	4.25
7/16	12	9	4.50
29/64	12	9	4.75
15/32	12	9	4.75
31/64	12	9	5.00
½	12	9	5.00

SEND FOR OUR CIRCULARS

VICTOR MACHINERY EXCHANGE, INC.

251 Centre St., New York, N. Y.

HILL-CLARKE
MOTOR DRIVEN GRINDERS



SIZES

10'x18'	14'x36'
10'x36'	14'x50'
10'x50'	16'x50'
10'x72'	16'x72'

HILL-CLARKE MACHINERY CO.
645 WASHINGTON BLVD. CHICAGO

MOREY Dependable Used Machines

ROCKFORD No. 2 Horiz. Boring Mill—Floor Type—M.D.
AUTOMATIC MACH. CO. 12x4' Threading Lathe
P & W No. 12 Multi-Spindle Drill
FOOTE BURT No. 3 Rail Drill
NATCO C-13 Hyd. Multiple Spindle Drill
COULTER 2 spindle Diamond Borer—M.D.
INGLE 12" Gear Tooth Rounders
G. & E. 48" Gear Cutter
GLEASON 24" Bevel Gear Planer
GLEASON 37" Bevel Gear Planer
GLEASON 10" Spiral Bevel Gear Gen.
GLEASON 6"-11" Bevel Gear Generators
LEES BRADNER No. 5A Gear Generator
LANDIS 3½" Internal Hydraulic Race Grinder
LANDIS 16"x36" Plain Cyl. Grinder—M.D.
HEALD No. 60 Internal Grinder
P & W 6"x132" Thread Miller
FELLOWS No. 4T Thread Generator

GRAY 30"x30"x8' Planer—2 heads on crossrail—M.D.

LANDIS 4" Single Head Bolt Cutter
COCHRANE & BLY No. 5 Cold Saw
ESPEN LUCAS No. 138 Cold Saw—Cap. 12" Rd.
NEWTON No. 200 Cold Saw—Cap. 11" rd.
N.B.P. 400 ton Hyd. Wheel Press
ACME 1" All Steel Upsetter
AJAX 3" All Steel Upsetter
SAUNDERS 8"-18" Pipe Threader, M.D.

THIS IS A PARTIAL LIST—Write us your specific inquiries.

MOREY MACHINERY COMPANY
410 BROOME STREET NEW YORK, NEW YORK

For Immediate Delivery

LATHES

16x10 Hendey M.D., Q.C.
Prentice 18x10 G.H.
21x10 LeBlond G.H. Crank Shaft
Prentice 38x18 G.H.
42"x24' Putnam, triple geared engine lathe. Geared face plate drive, blocks up to 52'
52x16' New Haven, Heavy Duty QC.
18"x16' Rahn Larmon Q.C., 3 step, D.B.G.

TURRET LATHES

No. 9 Foster 3" Capacity

GEAR CUTTERS

26" Brown & Sharpe
36" Fellows
G. E. 3x36 Spur
G. E.18" Spur & Bevel

AUTOMATICS

Gridley 2¼
Gridley Model G. ⅞ 4 Spindles
Cleveland 2"—1"—⅞"—4 spindles ⅞
New Britain 1"x15"

RADIAL DRILLS

4' Prentice
6' Prentice Geared Box M.D.

GRINDERS

Cincinnati Tool & Cutter Grinder 16x54 Norton
Brown & Sharpe No. 16 10"x72"

SHAPERS

16" Kelly
14" Chase
24" G. & E., M.D.

MILLERS

No. 4 B. & S. Horizontal
Becker No. 6

VERTICAL BORING MILLS

44" Rogers Turret Head
Niles 36 M.D.
Niles 30

PROFILER

No. 12 Pratt & Whitney

MISCELLANEOUS

28" Cin. Drill Press with Sliding Head, Tapping Attachments
Oeking 4x4 Angles Punch & Shear
Binsee Horizontal Boring Mill
1000 lb. Chambersburg Steam or Air Hammer Single frame
No. 3 Lees Bradner Thread miller
3 Slotters 10"—14"—16"

This is a partial list. Write us your requirements.

S. & S. MACHINERY CO.

207 Centre St., New York, New York

Good Used Machinery

BOLT MACHINES—Acme 1-Sp. 1¼" cap.; National 1-Sp. 3"; Landis 2-Sp. 1"

BORING MILLS—Baush 44" m.d. Bullard 51" Vert., 2 hds.; Colburn 42" one head; Mach. Tool 3" Horiz.

BRAKES—Keene 10' 16 ga. Toggle Press; D K 10' 14-ga.; D & K 8' 18-ga. Hand

COLD SAWS—Newton 9" cap., Cochrane & Bly No. 2-B; Higley No. 14

CUT-OFF MACHINE—Davis 6" cap.

DRILLS (RADIAL)—Carlton 4' all gear box dr.; Hammond 4' sensitive; Mueller 4½' g. box; Morris 3' Gr. Box; American 5'

DRILLS (H. S. B. B.)—H & W 2, 4, 5sp.; Sipp 1 & 2 sp.; Allen 2; Avey, Demco, Lel-Gif. 1-sp.; Avey, 2-sp.; Avey 6-sp.

DRILLS (MISC.)—Rockford 20" Heavy Grd. Feed; Barnes 20" & 24" 1-sp. & 20" 4-sp.; P. & W. 24 sp. rectangular head Adj.; Moline 4-Sp. Hole Hog; Colburn 20" S.P.D.; Barnes 25" Grd. camel back

GEAR CUTTERS—B & S 26" s. p. d. automatic spur; Cincinnati 36" gear cutter. B. & S. 48"x10"; G. & E. 48" gear Cutter; Fellows No. 3 Gear Shaper

GEAR GRINDER—Lees-Bradner

GRINDERS—P & W 12" vert. surf.; Cin. No. 2; Heald Nos. 60 & 65 Int.; Landis 10x30" Plain; Badger No. 220, auto. d. e., opposed disc (4); Cinc. 12x36" pl.; Modern 12x24" Pl. External; Heald No. 55 Int.

HAMMERS—Mayer 50-lb.; W & W 165 lb.; Kane & Roach 70 lb.; Beaudry 150 lb.; Bradley 200 lb. Upright Helve; W. & W. 125 lb. Air

LATHES—Monarch 16"x10' M.D.; Lehmann 18"x9"; Bridgeford 32"x18' Grd. Hd.; Davis 22"x10'; L & S 20"x10'; S-B & E 20"x10' q.c.g.; Flather 22"x10'; LeBlond 16"x8'; Monarch 16"x8' (2); Ryerson 20x 10', m.d.; S.B.E. 30"x12' Q.C.G.; Sidney 18"x8' and Flather 16"x8'; L. & S. 16"x 8' M.D.; S. Bend 16"x8' Maine 26"x14' Q.C.G.; Putnam 26"x14'

MILLING MACHINES—B & S No. 3, Owen Duplex; Ohio No. 24 Plain; B & S No. 12 Mfg. Type; Bilton No. 25; Ingersoll 2-sp. vertical; P. & W. Mfg. Type; Becker No. 25 Pl.; G. & E. Vert. Rotary Table

THREAD MILLERS—Moline No. 10

PLANERS—Pond 32"x34"x10'; Pease 26"x 26"x9'; Cincinnati 36'x36"x12' 2 Hds.; Gray 24x24"x6'; Cinc. 24x24x6'

PIPE MACH.—Oster 6"; B. & K. 12" cap.

PUNCH PRESSES — Ferracute No. P-4; Barouth No. 3 & No. 4 O.B.I.; Bliss No. 62; Toledo No. 31 & No. 32 Swaine No. 38 arch; Cons. No. 24 Blanking; Bliss No. 21; Bliss No. 18 & No. 19 O.B.I.

SAWS (HACK)—Atkins 8x8"; Racine 6x6"

SHAPERS—S & M, G & E, Ohio, Mi., Q. City, Davis, Ohio & G & E 20"; S & M, Q. City, Rock., Cin. 24"; American 24" heavy, b.g.; S. & M. 26", b.g. G. & E. 24", s.p., gearbox; Amer. 20"; Rockf. 24" gearbox; Stockbridge 26"; Am. 16"

SCREW MACHINES—8 Hand; Foster No. 3

SQUARE SHEAR—D & K 36" 14-ga. steel; Bertsch 5' 16-ga.

SLOTTER—Barr 12"; Betts 6" stroke; Niles 12"

TAPPING MACHINES—(2) Garvin No. 2 Vertical Automatic & Garvin No. 1

TURRET LATHES—Axelson Grd. Hd. 3" cap.; Woods 1" cap.; W & S No. 2; Colburn 30" Vert.; B & S Vert. 38"; Superior No. 3; J & L No. 2; Gisholt 24"

Above is only a small part of our large stock on hand

McDonald MACHINERY CO.
1531-35 N. Broadway ST. LOUIS, MO.

6' CYLINDER BORING MACHINE

48' P. F. to 6' BAR
No. 6 M. T.

TABLE POSITION ADJUSTABLE

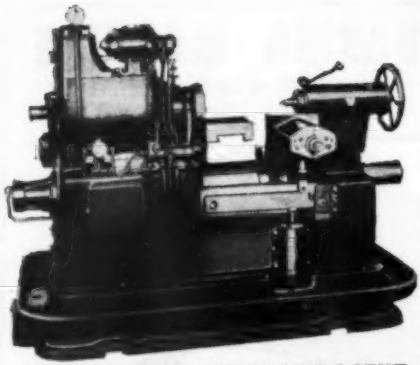
IMMEDIATE DELIVERY FROM CHICAGO

COUNTERSHAFT DRIVEN

6¼" Cleveland Model A Automatic
Barber-Colman Gear Rougher, double over-arm
Putnam Semi-Automatic Miller M.D.
Type B Gooley & Edlund Production Mill, M.D.
10"x24" Landis Grinder, self-cont.
No. 6-A Potter & Johnston Automatic Chucking Machine
24" Gisholt Universal Turret Lathe, 6¼" H.S.
No. 1 Brown & Sharpe Hand Screw Machine
3" Bement Dougherty Horizontal Boring Mill
3⅝" Barrett Horizontal Boring Bar
No. 2 Van Norman Duplex Milling Machine
14"x6' Lodge & Shipley Lathe, T.A.
No. 24 Gardner 53" Disc Grinder
24"x24"x6' Ohio Planer
¾" Gridley Model F Four Spindle Automatic
No. 2 Kearney & Trecker Vertical Hi-Speed Head
No. 2 Baker Keyseater, 2" capacity
18"x10' Whit. Blaisdell, g.h. lathe t.a.
No. 12 Barber-Colman Gear Hobber
8 Spindle Bausch Multiple Drill, No. 2 M.T.
32" Smith & Mills Shaper, friction drive, M.D.
No. 1 Adams Farwell Gear Hobber
2½" Cleve. Model A Automatic
2¾" Cleve. Model A Automatic
12" Pratt & Whitney Vertical Surface Grinder, magnetic chuck
24" Barker Crank Shaper, arr. M.D.
24" Stockbridge Crank Shaper
32"x15' Pond Lathe, L.C.G.
No. 3 Foster Hand Screw Machine
⅝" Pratt & Whitney Hand Screw Machine
6" Horizontal Cylinder Boring Mach.
1" Milholland Hand Screw Machine
1½" Cleveland Model B Automatics, (2)
18"x8' Advance Engine Lathe, QCG.
No. 3 Brown & Sharpe Universal Cutter and Reamer Grinder
Grant Production Mill
⅞" Model A Cleveland Automatic, Motor Drive
10 KW Diesel 110 volt DC Generator Set

BARRON MACHINERY CO.

627 W. WASHINGTON ST. **CHICAGO, ILL.**



NO. 17 BARNES AUTOMATIC LATHE

In Stock Immediate Delivery

Swing—over front cross slide . . . 13", Swing—over rear cross slide . . . 17", Swing—over carriage bar . . . 26", Distance from tailstock center to face of spindle nose . . . 20", Speed Range (8 speeds) . . . 30 to 375 RPM, Feed range . . . .001" to .100", hole thru spindle . . . 1½", Spindle taper . . . 3½" per foot—3½" diameter, Height of spindle center from floor . . . 41", Travel—Front carriage (standard) . . . 8", Travel—Rear carriage (standard) . . . 6", Speed main drive shaft . . . 600 RPM, motor driven with 10 HP 3/60/440 motor, wt. approx. 6500 lbs., Our machine equipped with quick acting tailstock.

VICTOR Machinery Co.

130-132 South Clinton St., Chicago, Ill.

REBUILT MACHINE TOOLS — — and we DO mean R-E-B-U-I-L-T

TURRET LATHES

2—2"x24" Jones & Lamson Flat Turret Lathes, all geared head, with cross sliding headstock
1—3"x36" Jones & Lamson Flat Turret Lathe, all geared head, with cross sliding headstock
1—24" swing Gisholt Univ. Saddle Type, two-step c.d., side carriage, hole through spindle 6¼"

LATHE

1—8"x84" Lo-Swing, all geared head, sgle. pulley dr., 2 18" side carriages and six tool holders

GRINDERS

1—8"x30" Modern Self-Contained Plain Cylindrical Grinder
1—No. 23 Landis Plain Cyl. Grdr., b.d. all pwr. feeds, max. swing 12", max. grind. length 32"
1—No. 14 Brown & Sharpe Plain Cylindrical Grinder, three-motor drive, with Master Electric driven headstock for infinite spdl. speeds; maximum swing 10"; maximum grind. length 30"
1—12"x18" Cincinnati Plain Cylindrical Grinder, three motor-drive, with Master-Electric driven headstock for infinite spindle speeds

BORING MILL

1—42" Colburn Vertical Boring Mill; motor drive less motor; with gear boxes for the change of the feeds; with two swivelling heads on the crossrail and with one drilling head

RADIAL DRILL

1—5' Niles-Bement-Pond Univ. Rad. Drill; m.d. thru gear box, without motor; diam. of col. 13"

AUTOMATICS

1—No. 22 Prentice (New Britain) Chkg. Mch. 1—No. 24 Prentice (New Britain) Chkg. Mch.

MISCELLANEOUS

1—No. 00 Pfauter (Schuchardt & Schutte) Gear Hobber; for spur and spiral gears and worm wheels up to 8" diameter and 8" face
1—3"x26" Brown & Sharpe Gear Cutter
1—mod. C-13-C Natco Mult. Spindle Drill Press; m.d. thru gear box; arr. for 14 spdls.; 9 spdls.
1—Natco Multiple Spindle Drill Press; motor driven through gear box; arranged for 20 spindles; with 14 spindles for No. 1 and No. 2 Morse taper
1—No. 3 Thiel Combined Filing and Sawing Machine

YOUR DEPENDABLE MACHINERY DEALERS

LAURENS BROS.,

SEVENTIETH & LONGVIEW STS.,
CINCINNATI, OHIO - Tel.: VAlley 7200

HILL-CLARKE QUALITY

BROACHES

No. 3-B J. N. LaPointe
No. 4 J. N. LaPointe

DRILLS

No. 1—1 spdl. Leland-Gifford
1 spdl. Henry & Wright
2 spdl. Leland-Gifford Bench
2 spdl. Henry & Wright
4 spdl. Sigourney
4 spdl. Henry & Wright
6 spdl. Henry & Wright
No. 3 Baker 2 Spdl. Cyl. Borer
No. 1 Bausch Multiple

GEAR CUTTERS

No. 4—48" Brown & Sharpe

DRILLS (RADIAL)

4' Western Plain

GRINDERS

HILL-CLARKE PRODUCTION UNIVERSAL MOTOR DRIVEN
12" x 36" 12" x 50" 12" x 72"
(*See page 356 Hill-Clarke Cylindrical Grinders*)

No. 40 Bryant Wide Wheel, Oscillating
No. 5 Springfield Planer Surface
No. 18 Bryant Internal
No. 60 Heald Cylinder
No. 10 Lees-Bradner Spur Gear Grinder

MFG. LATHES

3½"x60" Fitchburg Lo Swing
No. 4AC LeBlond Auto. Crankshaft

ENGINE LATHES

26"x10' Bridgeford Plain Turning
30"x12' Whitcomb-Blaisdell

PLANERS

36"x36"x8' Cincinnati

SLOTTER

10" Newton

MISCELLANEOUS

6" Saunders Pipe Machine
12" Bignall & Keeler Pipe Machine
60" Quickwork Rotary Shear
No. 4 Gaterman Pneumatic Tapper

HILL-CLARKE MACHINERY CO.
645 W. WASHINGTON BOULEVARD, CHICAGO

OTT MACHINERY SPECIALS

AUTOMATICS
Brown & Sharpe, No. 00
Cleveland, Model B, 1¼" with 18 feed
New Britain, No. 22, 23 and 24
Automatic Threading Lathes, 13"x8' G.H.
Gridley, 2¼, 3¼ & 4¼" S.S.

DRILLS
Edlund
Baush & Natco Multiple spindles
Henry & Wright, 1 to 8 Spdl., No. 2 mt.

GEAR SHAPERS
Fellows 36"

GEAR HOBBERS
Barber-Colman No. 3 & 12

GRINDERS
Heald No. 65 Cylinder
Landis, 10x36 Hydraulic, M.D.
Norton, 16x36" Crankshaft
Pratt & Whitney, 10" Mag Chk, Rotary Surface, M.D.
Diamond No. 3 Surf., Mag. Chuck, M.D.

LAPPERS
28" Bethel Player

LATHES
Sidney 16"x8' M.D.
Jones & Lamson, 2"x24" M.D.
Jones & Lamson, 3x36 M.D. Ser. 50,000

MILLS
Lees Bradner No. 3 Internal Thread

PRESSES
No. 94 Bliss, Solid Back
No. P 3 & 4, 6 P G 2 Fer., Solid Back
No. 34 Toledo Solid Back, Geared
No. 14½ Toledo Horning, M.D.

PLANERS
26"x26"x5' Gray, M.D.
60x60x15' Niles, 2 Rail Heads
Bedford, 39"x13' Openside, 1 Rail & 1 Side Head

TAPPERS
No. 1, 2 & 2X Garvin
6 Spdl. Holmes Tilted No. 3
5 Spdl. Webster & Perks Vertical

OTT MACHINERY SALES, Inc.
548 Second Ave., DETROIT, MICHIGAN

AVAILABLE!!

REBUILT—Ready to Ship
12"x36" Modern Plain Cylindrical Grinder, Self-contained
16"x36" Modern Plain Cylindrical Grinder, Self-contained
12" Sellers Vertical Slotter—Motor drive

LATHES
14"x8' Prentice, Geared Head M.D.
15"x8' Flather
18"x14' Reed—chuck
22"x10' So. Bend H.D. 12" Gap—Chck. etc.
24"x18' Fitchburg H.D.
33"x14' Fifield H.D. D.B.G.—chuck, etc.
Vulcan Prod. M.D. Front & Rear Slides, cap. 3"x18"—Semi-auto.—never used
3½"x36" Lo Swing S.P.D.

MILLS
3" Bar Niles Horizontal Boring—Knee type
4" Bar Niles Horizontal Boring—Knee type 76" feed to bar
24" Bullard Type Vert. Boring and Turret
Newton Keyseating with vertical spindle
No. 1 Prentice Vertical, M.D.
No. 7 Becker Lincoln Type

MISCELLANEOUS
4 spindle Foote Burt Gang Drill No. 5 MT
2 new Vertical Honing Machines M.D.
No. 6 Bryant Internal Grinder
No. 3 Diamond Surface Grinder 48" travel
30" Morton Draw Cut Shaper
21" Cincinnati Super Speed Drill M.D.
1, 2, spindle Leland & Gifford Drill
½" National Bent Tapper
16"x52" Landis Plain Grinder—self-cont.
LeBlond Turret Lathe—42" Gap
3—7½HP Bridgeport Snagging Grinders
No. 13 Pratt & Whitney Profiler—one spdl.
8 ton American Vert. rack & pinion Broach
Hendey Single End Centering Machine
No. 2 Mitts & Merrill Keyseater
36" dia. Bellevue oil tempering furnace
5 new Haico Hi-Speed Milling Heads

Our Engineering Service will aid in the Selection of Good Used Production Machines Now Available.

R. A. VINE'S MACHINERY WAREHOUSE
652 West Willis Avenue **Detroit, Michigan**

DEPENDABLE MACHINERY ★★ FALK—

GRINDERS—Cylindrical

20"x120" LANDIS Self-Cont., Motor drive
12x36" CIN. Pl., Arr. Motor dr.

Cincinnati Surface Broach No. 5—54" Duplex with Swivel Table, new in 1937

DISC GRINDERS

Gardner No. 8—40" disc, 30" Ring Wheel, B.B. Belt dr.
Gardner No. 4—20" Disc, 16" Ring Wheel, B.B. Belt dr.
Badger No. 2—16" Disc, Dble. End, Univ. Tables, Belt
Gardner No. 1—dbl. end Disc, 12" B.B. belt dr.
GARDNER No. 14, Ball Rear., double opposed, 20" discs

SHAPERS & SLOTTERS

15" HENDEY ,Fricl. Dr. (5), $450 each
20" CIN. Geared, Crank, compl.
20" Steptoe B.G. Crank Shaper
24" Stockbridge, Geared, Crank, Heavy, Cone drive
20"x20"x24" N-B-P SHAPER-PLANER, motor drive
12" New Haven Slotter; 32" Rotary Table
12" Gould & Eberhardt Back Geared, crank, cone drive
7" Rhodes combination Shaper & Slotter, belt drive

LATHES

42"x25' PUTNAM trp. grd., 17' 6" ctrs.; pl. chg. gr., scr. cut.
26"x16' GREAVES-KLUSMAN, Pl. chg. gr.; Scr. Cut. 20" Ch.
22"x16' REED light Pattern, Pl. Chge. gear; 11" Centers, $750
18x8 Lodge & Shipley Q.C.G. Late type
16x6 American, DBG., Q. C.
16x6 American Q. C. G. Taper, M.D.
14"x6' MONARCH cone dr. gk. change; Draw in bar & Collets, Chuck, etc.
14x6 Rockford, Q.C.G. Cone
11"x4½' DAVIS pl. change scr. cut. eng. lathe; compl.; $225
10"x4' LOGAN (NEW) Lathes; B. Brg. Spdl.; 1" Collet cap.; arr. for motor dr.; pwr. cross feed; $225 f.o.b. factory; priority certificate required; shipment from stock
7"x36" PRECISION BENCH LATHES—Hardinge, Sloan & Chase and others
8"x108" FITCHBURG LO-SWING LATHE, SPD.
18"x12' HAMILTON pl. change, cone dr. chuck
11"x4' F. & W. TOOLMAKERS LATHE, Taper att.
16"x6' SOUTH BEND pl. chge., Screw Cut. Eng. Lathes (2)

MILLING MACHINES

CLEVELAND VERT. MILLERS No. 1, new

SUDDEN DELIVERIES

No. 3H LeBlond Plain, Mtrzd.
No. 2 Pratt & Whitney Lincoln Production Mill
No. 2 Kempsmith Lincoln Prod.
No. 2 GARVIN DUPLEX PRODUCTION MILL
No. 12 F. & W. DUPLEX PRODUCTION MILL.

No. 4 Bliss Dbl. Crank Press, S.S. Tie Rod Construction, Back Geared, Mtr. Driven, 4" Stroke, Bed 32"x20" 50 Ton Cap. 11" Die hgt.

TURRET LATHES

3x36 J. & L., Double Spindle, fine cond.
GISHOLT 24"x6¼" Univ., Taper attach. Chuck, Tooling. Motor dr. perfect condition, immediate delivery. Rare bargain

RADIAL DRILLS

DRESES 4' Arm, Pl. Rad., c.dr.

DIE CASTING MACHINES 3—MADISON - KIPP late mod., 10"x12", 12"x14", 12"x16"

PUNCH PRESSES

Nos. 18 & 19 Bliss O.B.I.
No. 19 Truesdale OBI.
No. 4 Adriance OBI.
Nos. 18C & 19C Bliss O.B.I.
No. 4 MICHIGAN OBI.
No. 20B BLISS OBI.
No. 6 Waterbury Backed Grd., Open Back
No. 73¼ BLISS S.S. Pl. flywheel
No. 4 BLISS Back Flywheel Pl.
No. 2 BLISS Black Flywheel Pl.
No. 1—Bliss Back Flywheel Pl.
No. 3R—Marquette Grd. M.D.
No. 15N BLISS, arr. G.,M.D.(2)
No. 25N BLISS Grd., MD.; (3)
No. 1 BLISS S.S. Toggle Press
No. 1½ BLISS S.S. DBL. ACT. CAM PRESS
No. 41 TOLEDO HORN PRESS arr. Motor dr.
25 Ton Henry & Wright Hi-Sp. Press, dble. roll feeds
No. 1038 BLISS GANG DIE PRESS: Roll feed
No. 4½ BLISS three col. Forging Press with Taper Rolls
6 Ton General Flexible Press
12 Ton Fox Flexible Press
2000 lb. Massillon Steam drop Hammer
400 lb. Miner & Peck Belt drop, with Lifter
200 lb. Bliss Board drop ham.
50 lb. DuPont Blacksmith Hammer
15 lb. Bradley upright Strap Hammer
No. 30 BLISS ARCH PRESS, Plain
No. 25 NIAG. ARCH PRESS, Plain
No. 71 Waterbury Coin. Press 25 tons
No. 93D TOLEDO DBL. CRK. GRD. S.S. PRESS, Welded Frame
No. 75 Toledo Open Back Plain Flywheel Press
No. 16 Bliss Horn Press, 3" stroke, Motor Driven
No. 2 Niag. OBI; No. 0 V&O(3)
No. 3 American Can Co. OBI.
No. 53 Perkins Sprue Cutter
No. 2 Middleditch Sprue Cutter
No. 1—100 lb. Standard Auto. Drop Hammer
No. 702—BLISS TRIMMING PRESSES (2) Flat
No. 4 Waterbury open back, rigid bed, plain
520 Ton Southwark Hydraulic with Laurie Pump
SHERIDAN EMBOSSING PRESS, 24x36

AUTOMATIC CHUCKING MACHINES

2—No. 24 New Brit. 5 spindle
1—No. 23 New Brit. 5 spindle
1—J&L HARTNESS AUTO. CHK. LATHE; m.d. 6"x12"

GEAR CUTTERS

No. 2 WHITON SPUR GEAR CUTTER. Auto.
36" Gould & Eberhart, "Victoria Model" perfect Cond.
48" Gould & Eberhart, Mtr. Dr.; Complete; Perfect Cond.
No. 36B Gould & Eberhart, Spur and Bevel Gear Cut., Mtr. Dr.
No. 0, No. 1, No. 2, No. 3 STANDARD AUTO. GEAR CUTTERS, BILTONS

HAMMOND 10 H.P. BUFFERS—8 months old Mtrs. in base, 3-60-220/440

PIPE MACHINES

18" Saunders Motor Driven
12" Merrill Motor Driven
6" Williams Motor Driven
4" Curtis Portable, M.D.
2" Landis Belt Driven—fine

PROFILERS

No. 2 GARV. SGL. SPDL. b.d.

COILING MACHINES

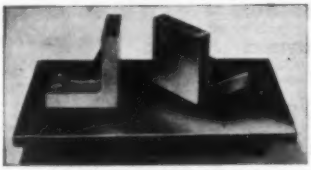
No. 1 and No. 2 SLEEPER & HARTLEY BX CABLE COILING MACHINES ¾ and 1" cap. Last used for Speedometer cable. Complete

KEYSEATER

No. 3½ BAKER 72"x3" Cap., immediate delivery

FALK MACHINERY COMPANY 18 WARD STREET ROCHESTER, N.Y.

ANGLE PLATES & SURFACE PLATES



Our Plates are Manufactured of Selected Grey Iron Castings, Fully Seasoned — They Will Not Change. Absolutely Guaranteed.

(Machined ± .002 From Flat)

ANGLE PLATES

SIZE	NET PRICE EACH
4"x 4"x 4" (1 RIB)	$ 4.75
5"x 5"x 5" (1 RIB)	9.25
6"x 6"x 6" (1 RIB)	12.25
8"x 8"x 8" (2 RIBS)	19.25
8"x10"x12" (2 RIBS)	28.00
12"x12"x12" (2 RIBS)	39.50

SURFACE PLATES

Size	*Weight*	*Net Price Ground*
12"x12"	41 LBS.	$20.00
10"x15"	45 LBS.	18.00
12"x18"	60 LBS.	22.00

(WE CAN ALSO FURNISH HAND SCRAPED SURFACE PLATES)

Fast Delivery Guaranteed

Lafayette Tool & Supply Co., 178 Lafayette St., New York, N. Y.

Send for Literature on our other Products

HIGH GRADE TOOLS—IMMEDIATE DELIVERY

1—24x24x6' Gray Planer, two heads on Rail
1—24x24x6 Lodge & Davis Planer, Motor Drive
1—24x14' American Lathe, 3 Step Cone, Double Back Geared, Taper Attachment
1—17" Raised to 27"x16' LeBlond Production Lathe, Timken Bearing Spindle, Q.C.
4—F & S Internal Grinders, Power Feed
1—Sprague 5 Ton Crane, 2 D.C. Motors, Floor Control, 18'6" Span
1—6x6 Peerless Universal Shaping Saw, Motor Drive
1—Pease Blue Print Machine
1—Keller Automatic Engraving Machine, Two Routing Spindles

WIENER MACHINERY CO., INC.

237 Centre Street **New York, N. Y.**

LATHES
16"x10' Lodge & Shipley P.C. Tap. Attach.
16"x12' Prentice Q.C. Tap. Attach.
BROACH & KEYSEATERS
No. 00 Baker keyseater
No. 3 LaPointe broach
GRINDERS
No. 1 Ott cylindrical plain, B.D.
No. 3 Landis universal, B.D.
No. 6 Rivett internal, B.D.
No. 9 Cinn. internal, B.D.
16"x72" Norton Surface
DRILLS
21" Cinn. B.G. pwd. fd.
22" Barnes B.G. pwd. fd. tap. attach.
16" Type "B" Allen H.S.
16" Type S.S. Allen H.S.
MISCELLANEOUS
No. 1 Garvin vertical tapper
No. 2 Dayton (Excelsior) swaging machine
2" Williams pipe machine M.D.
2" Bignall Keeler pipe machine M.D.
28"x28"x6' Pond planer H.D.—2 heads on rail
48"—14 gauge Poorman powered squar. shear
No. 52 Beloit Punch & Shear
No. 2 Garvin hand B.G.
No. 2 Toledo cam operated M.D.

FRYE MACHINERY SALES

32 N. CLINTON ST. CHICAGO, ILL.

AUTOMATICS

1¼" Cleveland Model B

No. 34 New Britain Chucking

BORING MACH.

4-¾" bar Niles, Knee Type M.D.

DRILLS, Radial

6 spin. Bausch No. 2 M.T.

6 spin. Henry & Wright Sensi.

5 spin. Henry & Wright Sensi.

4 spin. Allen, Sensitive

1 spindle Sensitive

No. 11 Natco, 8 spin.

30" Prentice Sl. Hd., Gear Box

No. 13 P. & W. Multi

No. 13 Natco Multi.

Baker Type M, Tapping

GRINDERS

No. 2 Churchill Internal, can grind 30" deep, dist. of center of spindle to top of table 18", M.D.

10"x24" Norton Pl. M.D.

20"x96" Landis Cyl. M. D.

24"x 96" Landis Cyl. M. D.

30" x 240" Landis Roll M. D.

24" Blount Snagging

LATHES

18"x8' LeBlond Q.C.G.

24"x12' Prentice Grd. Hd., MD.

26"/48"x12' Harrington Gap

28"x16' Pond, L. C. G.

30"x15' Putnam Axle M.D. Center Drive

36"x23' Pond Triple Grd.

36"/60"x15' Harrington, Sliding Bed Gap

42"/22' Putnam, blocks to 52"

90" N.B.P. Heavy, Wheel

MILLERS

8" Lees Bradner Thread

Hall Planetary Thread Millers, Style D

No. 6 Jackson Vert. Miller or Die Sinker, M.D.

No. 3 Garvin Duplex, table 12"x 64", 60" feed, AC M.D. (2)

PLANERS & SHAPERS

14" Steptoe Crank

26"x26"x8' Gray

24"x24"x8' Chandler, 1 hd.

PUNCH & SHEARS

72" throat Cleveland Style G Punch S.E., Cap. 2"x1", M.D.

60" Cleveland EF Punch

54" H. & J. No. 4 S.E. Punch Capty. 1½"1", M.D.

No. 4 H. & J. Dble. End P. S. 20" throats

No. 11 Schatz Triple Comb. Cast Steel Frame

No. 20 Schatz Type Tri. Combn. Cast Steel, Capty. punch 1¼"x ¼", 4½"x½" angles

No. 91, Size 11 Smith Armor Plate Tri. Combn. P. & S., coping attach., capty. punch ¾"x½", 4"x3"x5/16" angles

SLOTTERS

24" Betts Heavy Duty

16" Newton M.D.

10" Betts, Cone or M.D.

TURRET LATHES

24" Ryerson Conradson Heavy Duty

24" Gisholt 6¼" H.S., M.D.

3"x36" J. & L., Bar

18" Libby 3¼" H.S., M.D.

MISCELLANEOUS

Bolt Threader, 1"—1¼" Landis M.D. double hd.

Bolt Threader, 2" Landis

Bolt Threader, 1¼" Landis

Compressor, 179 cu. ft. M.D.

Cutting Off Machines, 6" cap. Williams M.D.

Furnace, Brass, 500 lb.

Furnace, Westinghouse Elec.

Gear Gen., 11" Gleason Bevel

Gear Cutter, 36" G. & E. Spur & Bevel

Gear Cutter, 60" Gould & Eberhardt

Hammer, 70 lb. Scranton, Power

Header, 1¼" Acme Rivet

Hobber, 8" Hercules

Jarring Mach., Herman Jolt Mould

Keystr., No. 6 Catlin, 40" stroke up to 5" wide

Keystr., No. 1 Davis, 1" capty.

Keystr., No. 3 Baker, 26" stroke x 3" Keyways

Keystr., No. 4 M & M, M.D.

Lapper, Norton Type 1C

Magnetic Chuck, 24"x18" Walker on right angle plate

Pipe Mach., 12" Curtis & C.

Pipe Machs. 3" Stover M.D.

Press, No. 61 Spec. V. & O.

Press, 1000 ton Watson Stillman Horiz. Hyd. Forcing

Press, No. 58 Perkins S.S. Grd.

Rolls, 12' Corrugating—Heavy

Rotary Table, 28" diameter

Rotary Tables, 26" and 36"

Saw, 10" Espen Lucas Cold

Saw, 10" Nutter Barnes Cold

Saw, No. 2B Cochrane Bly 6"

Saw, No. 15 Lea Simplex

Testing Machine, 200,000 lb. Riehle

Thread Miller, No. 3 Lees Bradner for 8" shells

Wire Straightener, ¼" Shuster, 20'

BENNETT & RAFKIN CO.

Offices: 30 CHURCH ST., NEW YORK CITY

National Red Ring Gear Lapper, md.
Bethel Gear Lapper, No. 1-C-A, md.
Lapper, Bethel-Player No. 1-F
Lapper, New Frazer
Lapper, No. 1 vertical
Keller No. E-3 Engraving Machine
No. 12 Barber Coleman Gear Hobber (3)
Gear Tooth Rounder, National Red Wing, M.D.
Grinder, Osterlein horizontal
Erie 800 lb. & 1000 lb. Steam Hams.
Univ. semi-auto. spline Grinders (2)
Lodge & S. 30"x16' g.h. Q.C. Lathe
National 16"x8' Q.C. Lathe
Milwaukee 28"x10' Semi Q.C. Lathe
Norton 18"x55" Plain Cyl. Grinder
Miller, Becker No. 25 Plain
Miller, Ohio 48" production
Press, Bliss No. 20 Inclinable
Press, Cons. No. 81 Horning Press
Presses, Horn., Toledo No. 11, No. 13
Press, Toledo 90-E straight side 42" between uprights M.D.
Press, Flexible 3-ton power
Kling No. 4 Single End Punch, 15" throat, gd.
Williams & White No. 13 Single End Punch, 36", gd.
New Doty No. 17-B Sgl. End Punch
Gisholt Clutch Balancing Machine
Gisholt Crankshaft Balancing Mach.
Milwaukee 24" Shaper, V-Ram
Tapper, Gaterman No. 8 M.D.
Gaterman No. 8 Automatic Oscillating Tapping Machine (3)
Fellows No. 4-T Thread Generator
Taylor-Winfield Butt Welder
Gear Hobber, Adams No. 1 (3)
Gear Tooth Rounder, National Red Ring, M.D.

F. W. BURNS MACHINERY CO.

1441 NORTH THIRD STREET, MILWAUKEE, WIS.

HUNDREDS OF MACHINES READY FOR SHIPMENT

BORING MILLS
Bickford 62" Two Head Vertical

DRILLS
P. & W. Nos. 11, 12, 13 Mult.
Upright Drills—many makes and sizes

GRINDERS
Bryant Nos. 6, 10A, No. 40 Chucking
Nort. 10x36
Landis No. 4 Universal
Brown & Sharpe No. 14—7"x48"
Farrel Roll Grinder
Landis 12"x32" Plain
Van Norman No. 43 M.D. Auto. Radial

LATHES
McCabe 26" and 42"x14'—2 Spindle
Fifield 36"x10'
Lo-Swing 4"x108"

MILLERS
Pratt & Whitney Lincoln Millers
Garvin Duplex
Becker No. 7-H Lincoln
Lees-Bradner No. 3B Thread

PRESSES
V. & O. No 12, 14 D.A.C. In.
Ferracute No. 105 D.A.
Ferracute No. PG-P4
W-F Type for cartridges (20)
Danville 4" Stroke Cut Back Frame Shear
W-F 30 Ton Cap. Rack & Pinion, for shells

SCREW MACHINES
Cleve. ⅜", ½", ⅝", ¾", 1¼ Auto.
Potter & Johnston Nos. 5A, 6A Chuckers
New Britain No. 23, 24 Chuckers
Goss & DeLeeuw 6"x6¼" M.D. Chucker

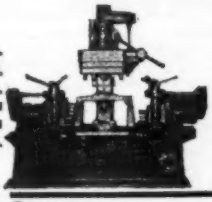
MISCELLANEOUS
Broaches, LaPointe 1-2-3
Cam Cutter—Manville
Degreaser—Colt Autoaan No. 21
Die Sinkers—Keller
Driller—Enterprise Rotary
Gear Generator—Lees-Bradner No 5A
Gear Burnisher—Fellows
Gun Barrel Machinery—Reamers & Drillers
Hammer—Standard 800 lb. Automatic
Hammers—Chambersburg 1500 lb. Steam Drop (4)
Headers, many sizes & makes
Planer—Pond 30x30x6
Planer—P. & W. 30x30x11
Planer—Cin. 72"x60"x12'—3 Head
Swagers—10 in stock
Taper Rolling Machine—Coulter & McKenzie
Upsetters—National, Ajax and Acme 4" & 5"

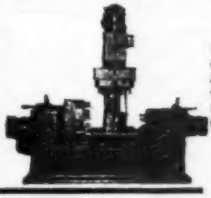
BOTWINIK BROTHERS, INC.

353 Welton Street, - New Haven, Conn.

Here's an opportunity to show American ingenuity. The following machines (all actual photos) were built for certain jobs. For example—one of these machines cost originally more than $8,000. We will sell it for $1,500. At this difference you can well afford to make the necessary changes in the tooling to meet your exact production requirements . . . and what is more important—*get immediate delivery!*

1—3 Way Leland-Gifford Multiple Drill, 2 horizontal heads, 1 vertical head; all power feeds; all heads individual M.D.

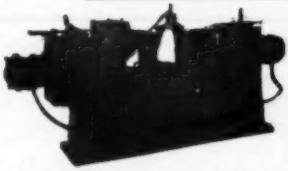




1—3 Way Leland-Gifford Multiple Drill & Tapper, 2 horizontal heads, 1 vertical head; all power feeds; all heads individual M.D.

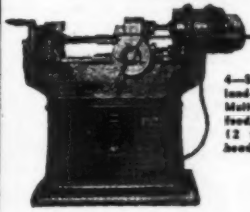
1—2 Way Leland-Gifford Opposed Multiple Drill, power feeds, both heads individual M.D.

1—Greenlee Opposed Head Multiple Spindle Drill, all power feeds, both heads individual M.D.



1—Leland-Gifford Opposed Head Multiple Drill & Tapper; all power feed; individual heads M.D.

1—Greenlee Single Head Horizontal Multiple Drill, with 30" diameter indexing table, individual M.D.



4—Single Head Leland-Gifford Horizontal Multiple Drills, power feed, individual M.D. (2 with 6 Spindle heads, 2 with 4 Spindle heads.)

1—2 Spindle 24" Barnes Camelback Drill, Spindle heads adjustable horizontally. Heads now set at angle. Can be arranged flush on rail. Arranged for M.D.

MACHINE TOOLS

DONBERG DANITS

WABASH 0123 **400 SOUTH CLINTON STREET** **CHICAGO**

No. 3 BRYANT HEAVY DUTY SEMI AUTOMATIC HOLE GRINDER M.D.
No. 2 FOOTE BURT 5 SPDL. INDEPENDENT FEED DRILL. CAPACITY 1⅜" IN SOLID STEEL. COMPOUND TABLE. WORKING SURFACE 19x120". NO. 4 M.T. SPINDLE HOLE. SNYDER TWIN RAM MASTER HYD. FEED MOTOR DRIVEN BORING AND DRILLING MACHINE
3 NO. 12 BARBER COLMAN GEAR HOBBERS

DRILLS
26" Barnes Sldg. Hd. B.G.
23" Rockford B.G. Pwr. Fd.
20" H.D. Mfg. Type No. 5
No. 4 Colburn 24" Mfg. No. 5
No. 1 Lel. Gif. Bench, T. A.
1 Sp. Allen, T.A.
4 Spdl. Henry Wright
1 & 2 Sp. Demco, H.S. - B.B.
Boley, 10 Spdl. Mult. Drills
2' Fosdick Pl. Rad. Gr. Box

LATHES
12"x5' Hendey, Q.C.G.
14"x10' Hendey Q.C.G., T.A.
15"x6' C & J Q.C.G.
18"x8' Mueller, Q.C.G.
16"x8' Greaves Klusman
18"x10' So. Bend Std. C.G.
No. 2 Bridgeport Hand Turret

GRINDERS
No. 3 B&S Univ. Grinder
No. 23 Baxter D. Whit. Int.
No. 1 Cinn. Univ. T & C.
Bristol Rotary Surf., 11¼" Dia. Mag. Ck.
No. 55 Heald Cylinder
No. 1 Micro-Honer, M.D.

MILLING MACHINES
No. 2 Becker Vert.

MISCELLANEOUS
Auto. Screw Machine, No. 53 Acme, 1" Cap, M.D. 4 Spdl.
Bolt Thrdr. ¼" Landis Sgle. Hd. M.D.
Broach, No. V-18 American
Comp. 8x8" C.P.T. Hor. Air
Die Filer, No. 5 Thiel, m.d.
Planer, 30x30x12' American
Planer, 36x36x12' W & P. 2 Heads
Plate rolls, 10' Long, 6" dia. rolls
Press, No. 1 Bliss Cam, Fly
Presses, No. 50 Wat. Far. OBI Flywheel
Punch, No. 3 L & A Geared 6" Throat
Press, No. 3 Bliss Stiles, Grd.
Riv. Hmrs. Nos. 1½B, 3A H.D., 4A Mtr. Dr. & 5A High Speed
Saw, 6x6" Racine High Speed Hack
Scleroscopes, Mod. "D" Shore
Tester, Brinnel Hardness
Welder, 20 KW Ace Spot

George M. Bernstein & Co.

12 SO. CLINTON STREET — CHICAGO, ILLINOIS

IF WHAT YOU WANT ISN'T HERE

Send Us Your Inquiry

BRAKES:
8'—18 ga. Chicago Steel, New and used
8'—16 ga. Chicago steel

DRILLS:
Hisey Wolf No. 26 Electric ½" $42.50
Van Dorn, 1¼" Electric 110 V. $50.00
Radial, Sens. 3 ft. American Prentice, 4-spdl. high-speed
Allen BB Type B sgl. spdl.
Allen 3-spdl., BB., cap. 1"
14" U. S. $35.00
20" Sibley & Ware B.G., P.F.
20" Barnes B. G. & P. F.

FORGING MACHINES:
Two 2½" Ajax; estd. wt. 47,000 lbs. each

GRINDERS:
Angle Plate, Clark & Cincinnati
Disc, No. 6-20 Besly Dbl. Spdl.
Flex. shaft, RA 5 Haskins
Emery, DE, Norton 24"
Emery, DE St. Louis 18"&20"
Plain & Surface, No. 1 La Salle
Surface, No. 1 La Salle
Wet tool, Springfield, 27" wheel

LATHES:
26"x14' Niles, PCG
14"x6' Rumsey, PCG
10"x42" Atlas, bench type, No. H-42, 1/3 HP. 110 V motor

LATHES—Turret:
12" Reed-Prentice BG

PRESSES:
Arbor, Famco and Atlas.
Arch, Bliss 30-A Grd., M.D.
Foot, Famco and No. 4 Swaine
Punch, No. 5 Bliss Stiles Grd.
No. 20 Excelsior ½" in ½"

PUNCHES & SHEARS:
SE W-W 14½, 25" thr. 1 in 1"
Rock River L. 24" thr. ½ in ½"
DE 1-10 Badger ½ in ½", 10" thr.

SAWS:
Hack, No. 3 Robertson 6x6"
Hack, No. 14 Atkins 6x6"
Wells No. 5 & 8, Band, Metal new

SHAPERS:
26" Hendy planer type dr.

SHEARS:
Dbl. action, No. 11 Excelsior, inside cutting, cap. 12 ga.
Rotary Bevel, Lennox ½"
Slitting, Rotary Nisg., cap. ¼" Throat 16"
Square, 36"x18 ga. Pexto Foot, New (3)
Square, 30"x18 ga. Ditto
No. 1236 Libert, 12 ga. 36" throat M.D. (New)
Throatless, 18 H Marshalltown

THREADERS, Pipe & Bolt:
Pipe, 2" Oster No. 302

MISCELLANEOUS:
Chucks, Lathe 4-jaw Ind. 8" to 16"
Compressor, Herron-Bury CCB, 14x9x8", 6' tank, 20 HP mtr.
Jacks, Lever Lift, 15 ton Joyce-Gridland; Simplex; 10-ton Barrett
Miller, Becker 7H, Lincoln type
Roll, Corrugating, 10" Robinson
Tappers, St. Louis & Garvin
Welders 2½, 5, 7½, 10 K W Dyer spot
Valve Refacer, ¼" Black & Decker

Brown Mchy. Co., 2333 N. Ninth St., St. Louis, Mo.

IS THE TOOL YOU WANT HERE?

BRAKES
4'x¼" Cincinnati Series 40-4 press brake with large lot of dies

BROACHES
Nos. 1 & 3 Lapointe
No. 3 American rack type
No. 3 J. N. Lapointe double
2 ton American vertical
No. 2 Standard broaching screw press

UPRIGHT DRILLS
20", 22", 25", 26" W. F. & J. Barnes
21" & 24" Cincinnati
21", 25" Superior
22" & 28' Aurora
26" Bickford
26" Hoefer

HEAVY DUTY DRILLS
22½" Barnes 4 spindle gang
24" Barnes, All Geared

GEAR MACHINERY
No. 18H G. & E. Auto Univ. Gear Hobber
No. 3 Barber Colman hobber
8"-10" No. 1 Lees Bradner Production hobber
14", No. 5A Lees Bradner hob.
26"x8" No. 3 Brown & Sharpe automatic
36"x6" G. & E. automatic spur
48"x10" No. 4 B. & S. auto.
National Tool Co. gear checker, Model B
2 spindle Lipe Chamferer
Pratt & Whitney worm grinder
15" Gleason bevel gear quencher

GRINDERS, MISC.
17"x36"-48" Norton hyd. crank pin. type B Model 184
18", No. 2 Gardner disc
18", Gardner semi-auto
24", No. 84 Gardner opposed
24" No. 8 Badger disc
24", No. 4 Gardner disc
53" Gard. Horiz. disc No. 24
10"x50 Norton cam
P. & W. worm or thread
No. 1 Sellers tool grinder
Gisholt Tool Grinder
24" Ingersoll tub type
16" Norton snagging
30" Ransom elec. snagging
2¼" Wil. & Morman drill
24" Ingersoll cutter grinder
Hutto honing machine
Nos. 50 & 60 Heald
Norton type 15 lapper
No. 575 Hawes polisher
14" Pratt & Whitney surface
20"x12"x50" Safety Emery Wheel Co., surface
Nos. 6 & 15A Bryant internals

HAMMERS
500 lb. Bradley helve
600 lb. Chambersburg b. d.
Nos. 1, 2M Pettingell bumping
Pettingell double unit, No. 2M

LATHES, MFG.
No. 16 Gisholt Simplimatics
1"x18" Pratt & Whitney auto.
9"x14" Porter Cable
10"x18" Adams "Short Cut'
13x6' Automatic threading
20"x8' Wickes 12 speed geared head Rapid Production
Melling camshaft 4 cyl. motor
Melling crankshaft 6 cyl. mtr.
No. 9 LeBlond Multi-cut

MILLERS, PRODUCTION & MISCELLANEOUS
No. 3C Lees Bradner thread
Nos. 1 & 1A Davis & Thompson drum
Nos. 10 & 45 Bilton Productomatic
Kempsmith, Fox Whitney, Superior hand mills
25"x25"x14" Ingersoll Slab
No. 7 Becker Brainard
No. 12 Brown & Sharpe

PLANERS
24"x24"x5' Gray
24"x24"x6' Woodward Powell

PUNCHES
¾"x¾" Rock River, 26" throat
1¼"x1" L. & A. 12" throat
1¼"x1" Cleveland horizontal
No. 54 Hendley & Whittemore comb. punch & shear

ROLLS
No. 1A Ajax taper forging
54" McKay sheet leveler
4"x3/16" Bay City roll

SAWS, METAL
6"x6" Toledo hack saw. New
6"x6" Racine hack saw
Grabo No. 2 metal saw table
4", No. 12B Higley cold saw
6", Nutter & Barnes-Greenfield Cold Saw
7" No. 14 Higley Cold Saw
2¼" No. 17 Racine Abras. c.o.

SHAPERS
36" Morton draw cut, power rotary feed to head

SHEARS
18" Pels all steel beam shear
No. 418 Toledo squaring
No. 0-15 Stanley Unishear
Newbold guillotine
Lewis Alligator
No. 1 Hilles & Jones Alligator

SHEET METAL TOOLS
4'x¼" Cincinnati press brake
Nos. 1 & 2M Pettingell bumping hammers
⅜"x3' Shuster wire straightener & cutter
⅜"x5' Shuster wire straightener & cutter
No. 3 RH Magee wiring mch.
No. 1B Campbell Nibbler

SLOTTER
12" Dill

SWAGER
No. 6 Langelier with feeder

THREADERS
½" Webster & Perks double
½" Acme double head
¾" Economy
1½" Geometric with 1" Murchey die head
1", 2" & 2½" Landis single
2" Acme
2" Landis 2 spindle pipe & nipple threader
2"x2½" Landis 2 spindle
2" Rogaco pipe machine

UPSETTERS
2½" & 4" Ajax
1½" Acme
2" National
No. 1A Ajax forging rolls

WELDERS
12 KVA Am. Elec. Fusion spot
17 KVA Thompson Gib spot
20 KVA Agnew spot
20 KVA Taylor spot
20 KW National, 220 V.
20 KW Taylor Maestra port.
23 KVA Winfield
150 KVA A.E.F. projection, multiple spot
375 KVA Fisher, press type
25 KW Winfield butt, 220 V.
30 KVA Thomps. butt, 220 V.
35 KW No. 60 Federal butt
65 KW Federal butt
150 KVA No. 35 Swift flash butt

Put your surplus machines to work! Please mail us your list.

"Keep'em flying"

MILES MACHINERY CO., SAGINAW, MICH.

MOSER'S HIGH GRADE TOOLS

Thread Miller, 4½x12" Pratt & Whitney
Grinder, Sanford Centerless
Grinder, 8"x24" W. & M. Surface
Grinder, No. 3 Ohio Univ. T. & C.
Grinder, No. 60 Heald Internal
Grinder, No. 65 Heald Internal
Grinder, Model 81, Type B 14"x36" Norton Crankshaft
Boring Mill, 36" Niles Vert. with turret head on rail
Turret Lathe, 28" Gisholt, 3¼" hole in spd.
Screw Machine, No. 1 Foster, A.C. & B.F., extra air chuck
Chucking Machine, No. 33 New Britain comp.
Auto. Piston Turning Mach., No. 2P P & J
Radial Drills, American 3'-9" dia. col., quick change gear box (2)
Radial Drill, American 3' Sens., B.D.
Drill, 24" Superior Upright, M.D.
Drill, 27" Rockford Upright, G.P.F.
Drill, No. 1—2-Spdl. Avey
Drill, No. 2—2-Spdl. Leland-Gifford
Drill, No. 10—16 Spdl. Bausch
Planer, 24"x8' Whitcomb-Blaisdell
Lathe, 9"x6' South Bend L.C.G.
Lathe, 16"x8' Lodge & Barker L.C.G.
Lathe, 18"x8' Springfield Q.C.G., T.A.
Lathe, 30"x16' Fifield L.C.G., C.H.
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Press, 100 ton Hydraulic Press Co.
Keyseater, No. 0 Mitts & Merrill
Centering Machine, 4"x24" Whiton Sgl. Spindle
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Tapper, ¼" Tuttle Vertical
Bolt Cutter, 1¼"
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Punch, S.E., No. 7 L.&A., 4" tht., belted md.
Reamers, 3¼", 4¼", 4-5/16" adj. HS.
Reamers, 5¼" Adj., HS. Kelly
Riveter, 2-A High Speed for M.D.
Saw, Hack, 6"x6" Robertson No. 2, Motor 1/60/110 V.
Shaft Straightening Mach., No. 3-A Grier Hand
Shear, Bar, United, open front, 12" blade, cap. 10'x1¼", for M.D.
Shear, Bar, Fischer, open front, cap. 10x2", for M.D.
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Taps, Collapsible, 1¼", 2", 2¼", 2¾"
Threading Mach., Auto. 2" Rickert-Shafer, boring & Chamfering tools, M.D.
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No. 61 Fellows Gear Shaper M.D.
9" Pratt & Whitney Gear Grinder
No. 4-48" Brown & Sharpe Gear Cutter
Lees Bradner Gear Grinder (2)
PUNCH PRESSES
No. 303 Bliss St. Side, M.D.
No. 225 Adriance, Solid back
No. 50 Mossberg & Granville
DRILLS
3' Carleton Sensitive Radial
3' Morris M.D.
3-4 American M.D.
4 Spindle Henry & Wright
B-16 Natco—M.D.
4 Spindle Taylor & Fenn M.D. (2)
TURRET LATHES
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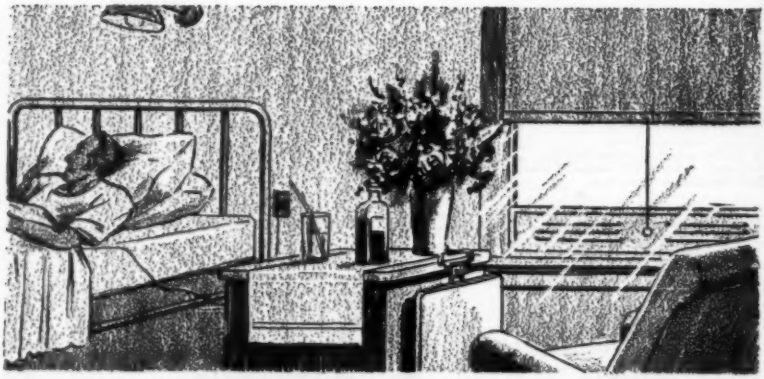

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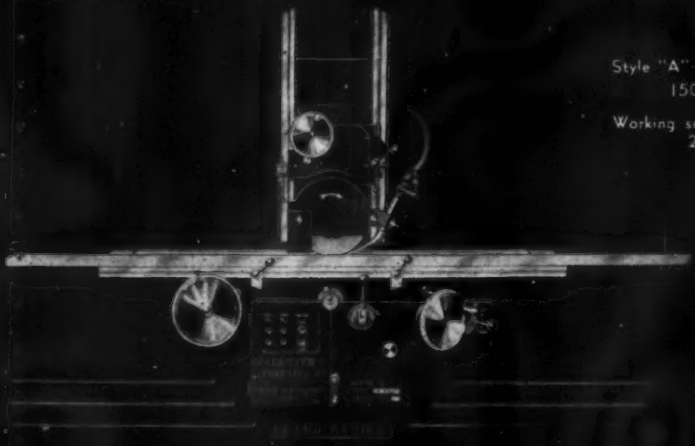

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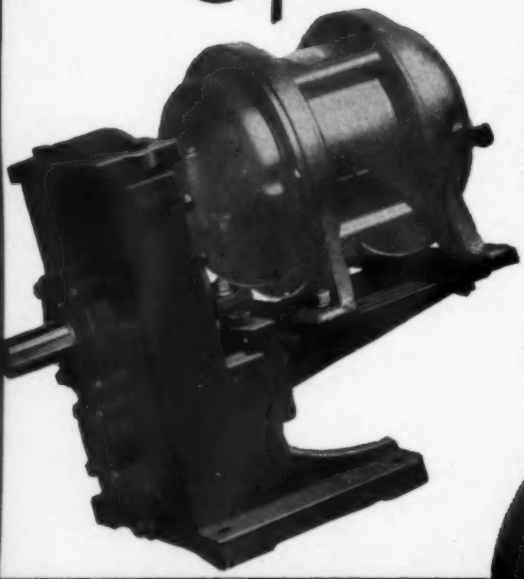

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